

The Global Trigger List

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Shifter Tutorial

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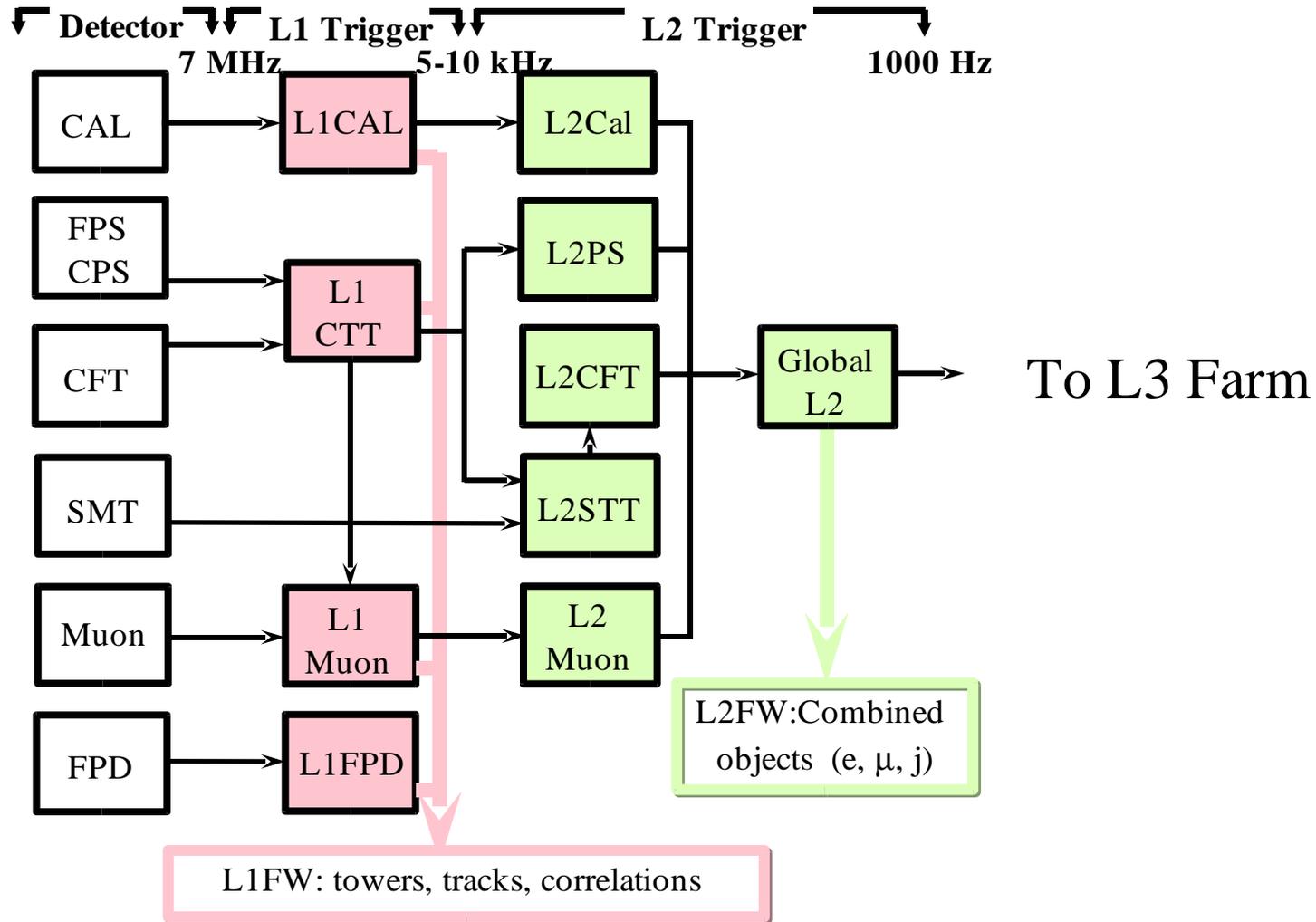
Brief Outline

- Construction of a trigger list
 - Many of these slides are thanks to Elizabeth Gallas
- Trigger Monitor tools

Trigger Fundamentals

- Effect of the ‘Trigger’ system
 - given over a million opportunities for collisions (‘events’ per second)
 - choose <50 to record for later analysis
- Selecting events:
 - Some fraction of these events are not ‘rare’ (but still useful):
 - Low energy jet production via QCD ...
 - Measure luminosity ...
 - Detector monitoring ...
 - The study of rare processes and the discovery of unknown phenomena require maximal ‘exposure’ to the beam
 - Need well designed triggers that can remain unrescaled at the highest luminosity
- The trigger system is designed to
 - Record the wide variety of processes that D0 physicists are interested in.
 - It does this using a ‘trigger menu’ (or Trigger List) which is complex by necessity

The D0 Trigger system – L1/L2



Trigger System Design

- Fast, complex, high rate, ..., multi-level
 - Level 1 - electronics and firmware
 - reduce 1.7 MHz to 5-10 kHz (presently 1600 Hz) by looking for interesting signatures (high Pt tracks, high Et energy deposition)
 - Level 2 - firmware and software
 - 10 kHz to 1kHz by refining L1 objects, match objects found by different detectors
 - Level 3 - software
 - 1kHz to 50 Hz - execute streamlined versions of offline reconstruction programs to select events.
- Programmable !
 - through the ‘trigger configuration’ generated from Trigger Lists stored in the Trigger Database
 - and online resource allocation by COOR

Trigger Database Purpose

- Generate:

- precise programming for trigger configuration
 - ONLINE
 - SIMULATION
- The configuration format: ‘xml’
 - Extensible Markup Language (XML) universal format for structured docs and data on the web
 - The trigger ‘xml’ does not contain all the information stored in the trigger database, specifically wrt versioning, how one trigger list relates to another triggerlist, or descriptions.

- Store

- all global Trigger Lists used online in Run 2
- Bench march Trigger Lists for simulation

- Report

- trigger configuration settings
 - for use by offline analysis programs
 - Et thresholds, eta ranges ...
 - to the collaboration (web), with some documentation features
 - not intended as a substitute for trigger subsystem documentation !

Trigger Database Implementation

- Design:

- Three levels of decision making
 - Level 1 - hardware, firmware
 - Level 2 - firmware, software
 - Level 3 - software
- complexity is a reflection of the complexity of the trigger
- symmetry/commonality is taken advantage of wherever possible
- seemingly cryptic nomenclature reflective of trigger programming.

- Implementation:

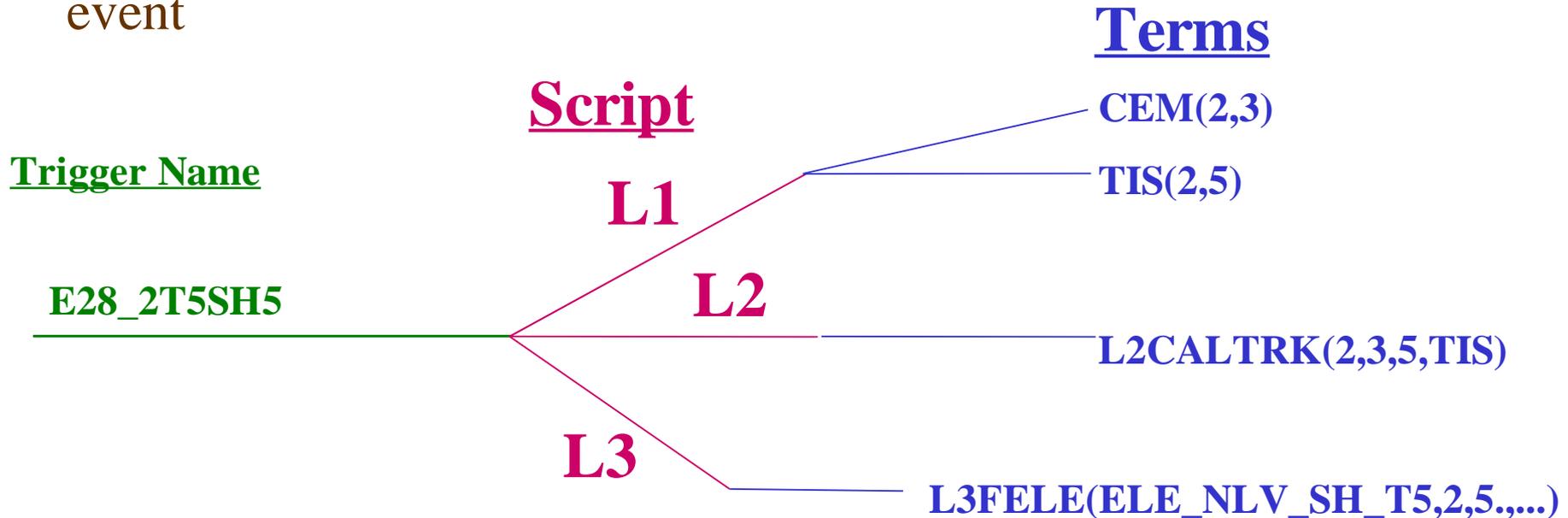
- IN USE for all global trigger configurations since December 2001

- Documentation:

- Specifications from
 - COOR document (Scott Snyder)
 - D0 Trigger/Online Groups
- Trigger Database
 - see Entry Interface 'help' button

A Trigger is a Logical Condition

- identified by a **trigger name**
- with a set of criteria called a Script at Level 1, Level 2, and Level 3
 - > Each of which is satisfied if all of its logical conditions or **TERMS** is satisfied
- satisfied (true) for an event if all 3 Level Scripts are true for that event

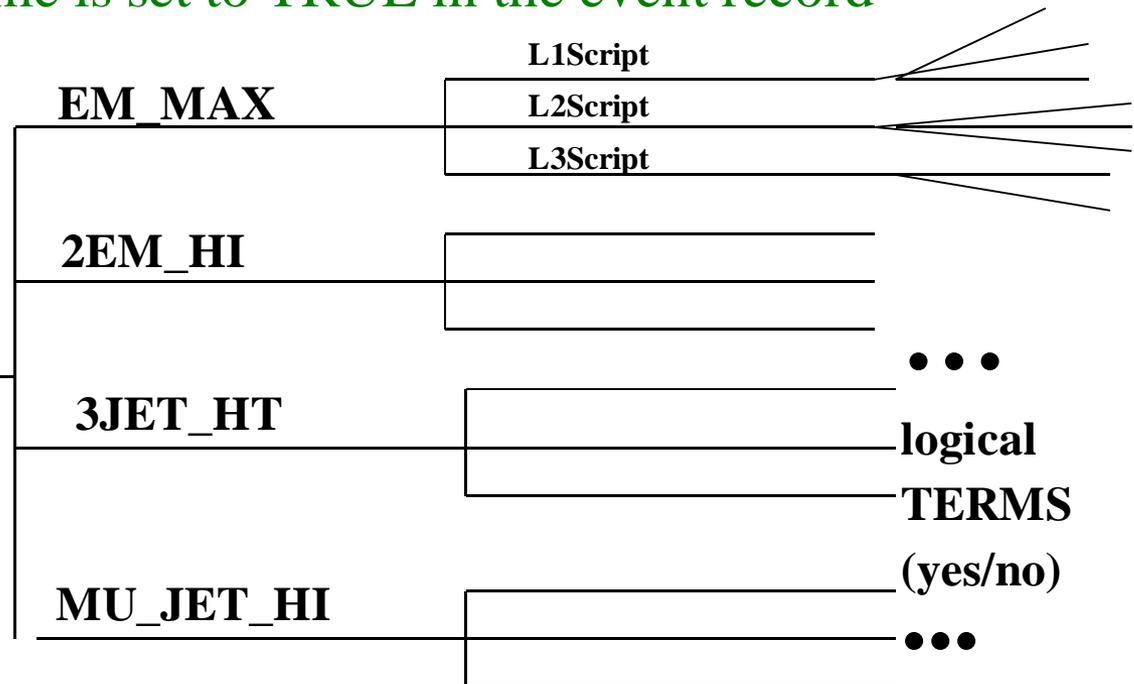


A Trigger List

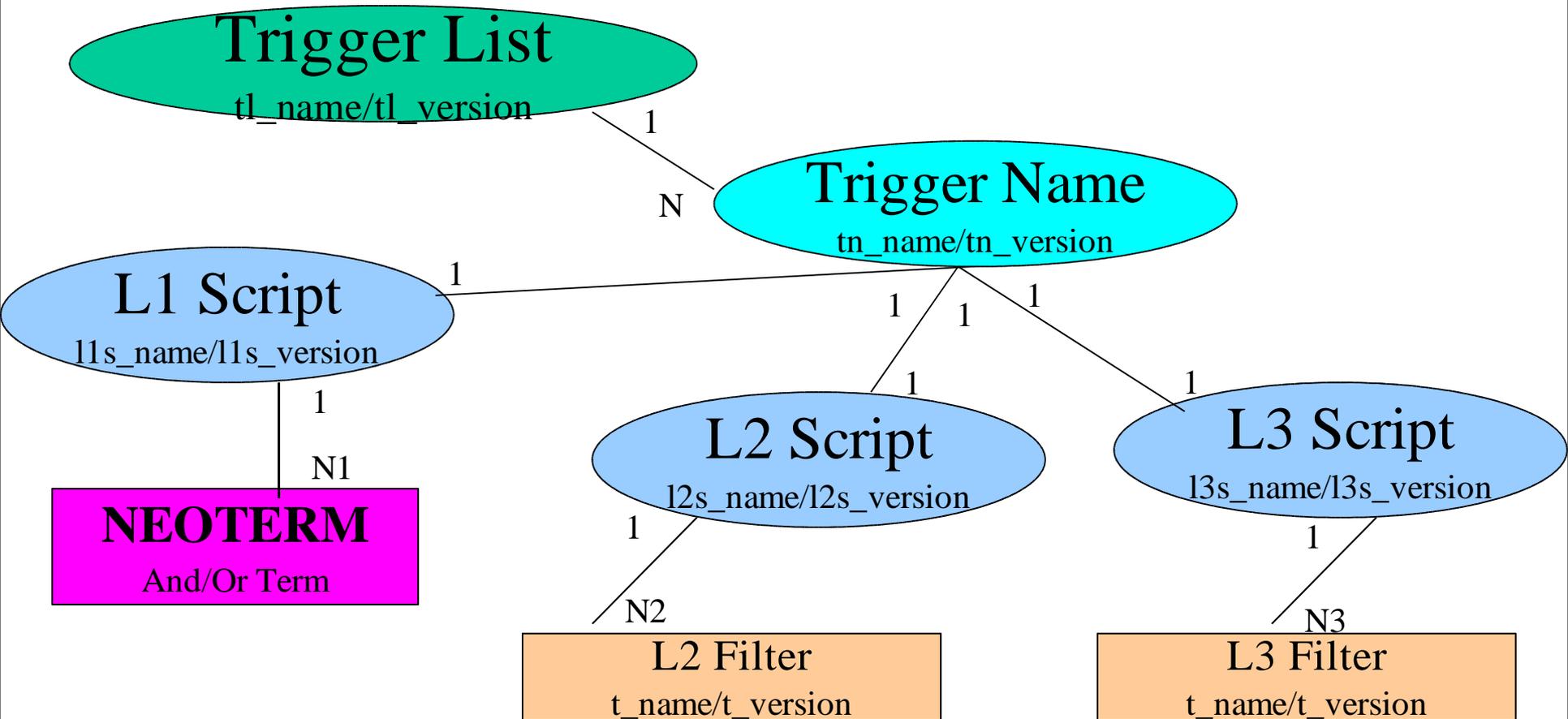
- identified by Triggerlist Name/Version
- contains one or more triggers
- like a tree with Triggers as branches
 - if any trigger is satisfied, the event is recorded and the trigger bit for that trigger name is set to TRUE in the event record

Example:

global_CMT-?.??



Trigger Database Design



NAME/VERSION scheme is repeated throughout the design.
The name is intended to reflect the conditions in that definition

Trigger Nomenclature – L1

- NEOTYPE – an L1 detector class
 - Group NEOTERMS which shares common download mechanisms
 - Examples: ctt, fpd, fps, muo, emcount, jetcount ... specterm
- NEOTERM – the “And/Or terms”
 - For any event: result is TRUE or FALSE
 - Map into the L1 And/Or Framework
 - Combine one/more to form a Level 1 Script decision
 - Examples: TTK(1,1.5), Afastz ...
- L1 Script decision
 - Logical AND of one/more NEOTERMS

Level 1 Trigger Systems

C -- Calorimeter -- based on Calorimeter “trigger towers”

- emcount / CEM(n,Et[,Hv]) – Cal EM TTower
- jetcount / CJT(n,Et) – Cal Jet (tot) TTower
- misspt / CME(MEt) – near future

M -- MUON – based on Muon system scintillator, PDT,MDT and CFT

- muo / MUO(n,Pt,eta,scint,wire,option)

T -- CFT/CPS

- ctt / TTK(n,p) – CFT track
- ctt / TIS(n,p) -- Isolated track
- ctt / TIQ(n,p,q) -- Isolated tracks in a quadrant
- ctt / TIL - Isolated track(s) with low home-sector occupancy.

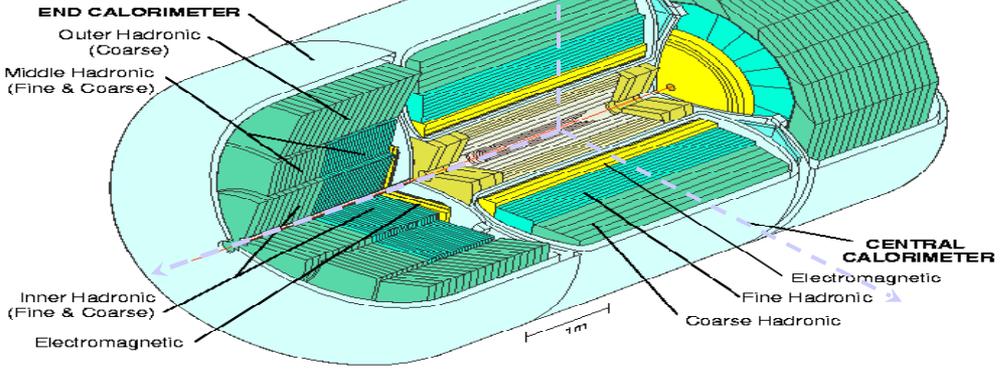
A -- Special (L1 Framework terms)

– constructed from signals from: the Accelerator, Luminosity Monitor, Trigger Timing and Control

- Afastz, ALiveBX, ASkip0 ...

DØ: Calorimetry

DØ LIQUID ARGON CALORIMETER

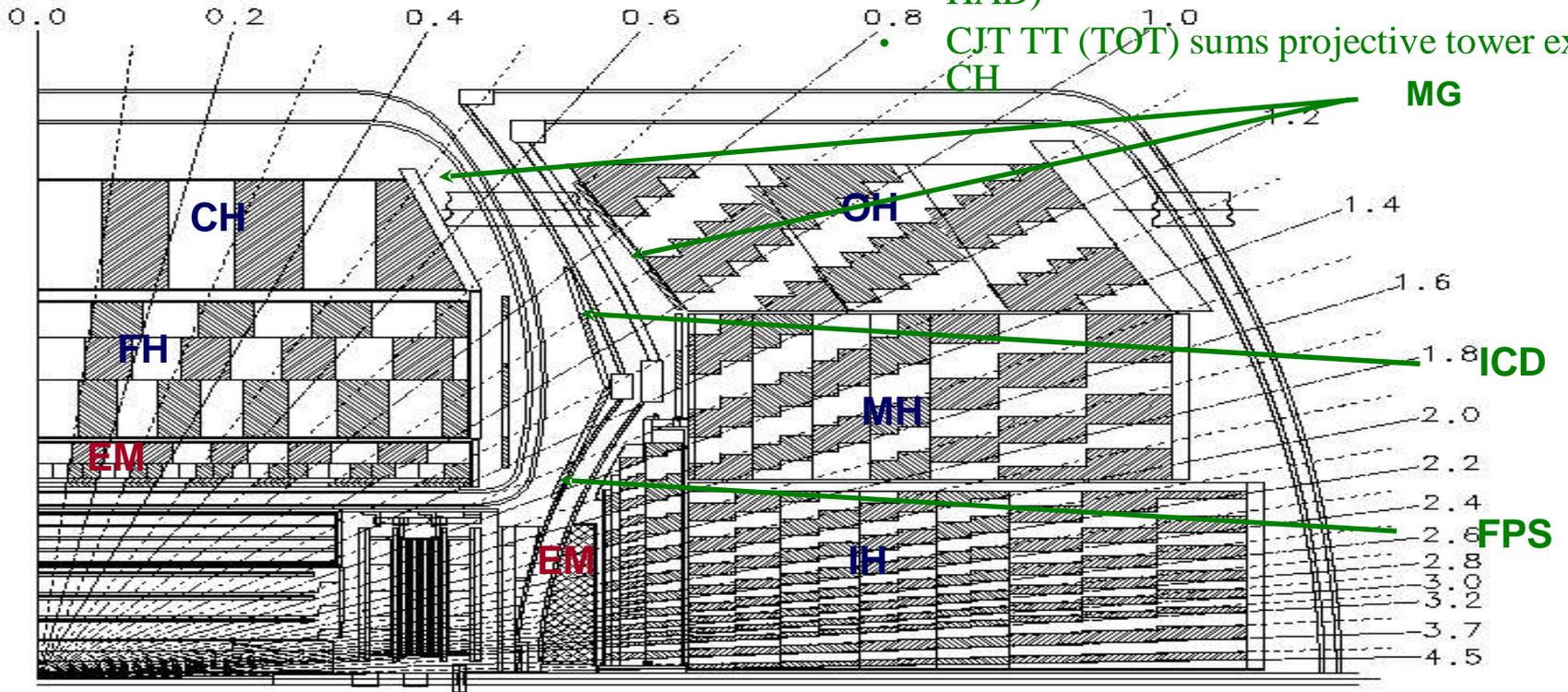


Features

- Projective geometry
- Cell size: 0.1 x 0.1 in eta x phi

L1 Cal Trigger exploits features

- Fast summing of Cal cell energies in towers (called Trigger Towers or TT)
- 0.2 x 0.2 in eta x phi
- CEM TT sums EM section (optional veto on HAD)
- CJT TT (TOT) sums projective tower exclude CH



L1 Muon Trigger

Trigger Object Report - Netscape

Name= **MUO** , Version= **2.00** , Use_Status= **used** , Current_Status= **current** . Created (Modified) by Gallas on 06-Jan-2002_18:00 (06-Jan-2002_18:00)

Description: **Muon global track combining CFT and/or Central Muon (PDT's and Scintillator) and/or Forward Muon (MDT's and Pixels).**

See Level 1 Muon Terms Description

order	name	type	Description
1	Mult	int	Muon track multiplicity. Possible values: <ul style="list-style-type: none"> • 0 == no tracks, • 1 == one track, • 2 == two tracks, • 3 == three tracks (generally not implemented but could be).
2	Pt	string	Pt (transverse momentum) threshold. Possible values: <ul style="list-style-type: none"> • ptx == no momentum selection (L1CFT not used), • pt1 == pt1 of the L1CFT, • pt2 == pt2 of the L1CFT, • pt3 == pt3 of the L1CFT, • pt4 == pt4 of the L1CFT.
3	Eta	string	eta (pseudorapidity) range. Possible values: <ul style="list-style-type: none"> • C == Central: $\eta < 1.0$ (central muon system only), • W == Wide: $\eta < 1.5$ (CFT system coverage), • A == All muon: $\eta < 2.0$ (muon system coverage), • N == North: eta between -1.0 and -1.5, • O == north: eta between -1.5 and -2.0, • P == north: eta between -2.0 and -1.0, • S == South: eta between +1.0 and +1.5, • T == south: eta between +1.5 and +2.0, • U == south: eta between +1.0 and +2.0, • B == Between: $-2.0 > \eta > 2.0$ but not $-1.0 > \eta > 1.0$. (forward muon system only)
4	Scint	string	L1CFT and scintillator quality (MTC05). Possible Values: <ul style="list-style-type: none"> • L == Loose, • T == Tight, • X == no requirement • E == Experimental.
5	Wire	string	Wire and scintillator quality (MTC10). Possible Values: <ul style="list-style-type: none"> • L == Loose, • T == Tight, • X == no requirement • E == Experimental.

Document: Done (2.764 secs)

L1 CTT Trigger

REPORT: Neotypes and Neoterms

Level 1 detector : CFT/CPS , NEOTYPE/Version= **ctt / 2.00** , Use_Status= **used** ,
Current_Status= **current** , created by toole on 09/18/2002 00:00:00

Description: **CFT/CPS terms: These terms are as described in [D0 Track and Preshower Trigger Levell Trigger Terms and Data Transfer Protocols, v07-00.](#)**

- ◆ **pt thresholds = 1.5, 3, 5, 10 GeV**
- ◆ **n: number of tracks**
- ◆ **p: pt threshold = 1.5, 3., 5, or 10 GeV.**
- ◆ **q: quadrant number = 1, 2, 3, or 4**
- ◆ **occ: Average fractional occupancy in a a CFT trigger sector.**
- ◆ **nsep: Separation in terms of CFT trigger sectors.**

- ◆ **TTK(n,p) CFT track.**
- ◆ **TEL(n,p) CFT track with preshower.**
- ◆ **TPQ(n,p,q) Low pt CFT track(s) with preshower deposition in a quadrant**
- ◆ **TNQ(n,q) Preshower cluster in a quadrant.**
- ◆ **TDL(n,p,s) Pair(s) of track/preshower with same (ss), opposite (os), or don't care (ns) charge signs.**
- ◆ **TIS(n,p) Isolated tracks.**
- ◆ **TDS(n,p,s) Two isolated CFT tracks with same (ss) or opposite(os) charge sign.**
- ◆ **THT(occ) Fraction of total CFT doublet hits.**
- ◆ **TAC(nsep) Track Accoplanarity. The number of sectors between two highest pt octants**
- ◆ **TIQ(n,p,q) Isolated tracks in a quadrant**
- ◆ **TOC(n,p) Octants with sum pt above threshold.**
- ◆ **TTA1 Number of tau candidates ≥ 1**
- ◆ **TTA2 Number of tau candidates ≥ 2**
- ◆ **TIL Isolated track(s) with low home-sector occupancy.**

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Audience Participation @ L1!

- Decode L1 neoterm name: CEM(1,5)
 - Starts with a “C” -- Calorimeter
 - CEM (Sum Electromagnetic Trigger Towers)
 - CEM(n,Et[,Hv])
 - N = 1 – Requires ONE EM TT with
 - Et > 5 GeV and
 - No Hv – NO Hadronic veto
- Decode L1 neoterm name: mu2pt3wtlx
 - Starts with a “m” – Muon / (maybe CTT)
 - MUO(n,Pt,eta,scint,wire,option)
 - N = 2 – DIMUON
 - Pt3 – requires pt > 3rd CTT threshold
 - Region = ‘w’ – WIDE region (CFT coverage)
 - Scint = ‘t’ – TIGHT req. on muon scintillator
 - Wire = ‘l’ – LOOSE req. on muon PDT/MDT’s
 - Option = ‘x’ – no additional options
- Decode L1 Script Name (seen in DAQmonitor): TTK(2,3.)TTK(1,5.)_CEM(2,3)CEM(1,6)_ncu

L1: Whaaaaat's that ?

- ‘_ncu’ – started appearing in L1 Script names for global_CMT-11.00
 - Cal_unsuppressed / 1
 - New trigger in it's own exposure group
 - Read out all Calorimeter cells unsuppressed
 - All other triggers were changed to veto on that L1 condition
- Other ‘short names’ used in L1 Scripts:
 - ‘_fz’ – requires Afastz
 - ‘_nfz’ – veto on Afastz

Trigger Nomenclature – L2, L3

- OBJECT

- Has a distinct name
 - At Level 2: EM, JET ... or at Level 3: L3TEle
- Has a distinct set of parameter definitions
 - Name, type, default, min, max, description
- Has a distinct type
 - TOOL or FILTER
 - Basis for all TOOL and FILTER TERMS (below)
- Associated with one/more L2/L3 ‘releases’

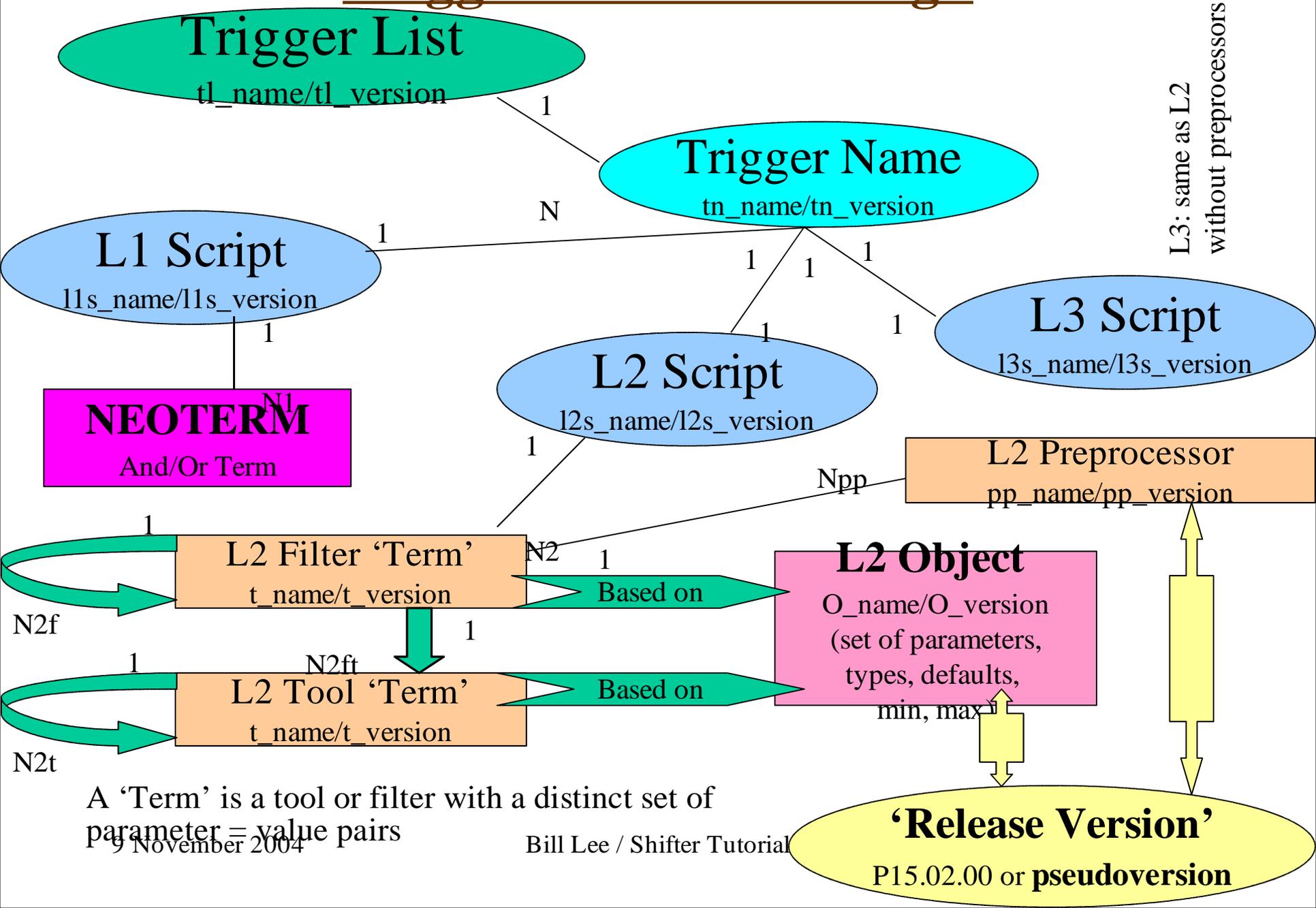
- TOOL TERM

- An instance of a TOOL type OBJECT giving values to each parameter
 - Aside: At L2, TOOLS depend on getting input from the L2 preprocessors in the Run
- Can depend on other tools
 - Example: Jet finding TOOL uses clusters from a Cal Cell Clustering TOOL which uses Cell Energies unpacked by a Cal Unpacking TOOL
- **Finds candidates** for other tools, filters

Trigger Nomenclature – L2, L3 (cont)

- **FILTER TERM**
 - An instance of a FILTER type OBJECT giving values to each parameter
 - Can depend on other filters
 - May find candidates for higher level filters
 - **Makes cuts on candidates**
 - For any event: result is TRUE or FALSE
- **L2,L3 Script decision**
 - **Logical AND of one/more FILTER TERMS**

Trigger Database Design



Trigger List History

[Link off of Triggermeister page](#)

File Edit View Go Bookmarks Tools Help

http://www-d0.fnal.gov/trigger_meister/private/www/tl_desc/global.html

TriggerMeister's Webp... TrigDb DAQ Shifters' Page My Yahoo! Redhat trig tabs beam status

Global Trigger List Descriptions

[global CMT-13.21 -- Runs using this TriggerList !](#)

Changes from global_CMT-13.20:
bug fix to the L1 Muon logic in central octant 6.

[global CMT-13.20 -- Runs using this TriggerList !](#)

Changes from global_CMT-13.11:

Major L3 revisions

- JT
 - JT4_HT_LM3_2TAM -> JT4_HT_LM3_2LM0
- DMU
 - DMU4_2TAM_IMJ_VX - change upper mass limit to 2 TeV
- QCD
 - JT_L3M225 -> JT_L3M250
 - JT_L3M380 -> JT_L3M430
- MUH
 - MUH1_TK12 -> MUH1_TK12_TLM12 (name change only)
 - MUH2_LM3_TK12 -> MUH2_LM6_TK12
 - MUH3_LM3_TK10 -> MUH3_LM6_TK12
 - MUH4 -> drop suite
 - MUH6_TK10 -> MUH6_TK12_TLM12
 - MUH7_TK10 -> MUH7_TK12
- TAU
 - TAU2_NN10 -> TAU2_2NN10_NN
- EM
 - Tightning of EM triggers
 - T7SHT8_M10 -> T7SHT8_M15
 - SHT8_ITK10 -> SHT10_ITK10
 - IT7SHT8 -> IT10SHT10
 - SHT15_M15 -> SHT15_M25
 - T13L15 -> T13SH15
 - L20_M25 -> L30_M25

Done

Report: global CalMuon-13.21 (1)

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http://d0db.fnal.gov/trigdb/cgi/tdb_report_element.py?function=Trigger+List&intlname=...

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Trigger List Report

Trigger List Name input: [intlname , intlversion] = [GLOBAL_CMT , 13.21]
TRIGGER LIST Name/Version= global_CMT / 13.21, Use_Status= **permanent**, Current_Status= **local**
Implementation in: **primary** DAQ system, Configuration Type = **physics**, autopause= **yes**, comics_runtype= **data**, l3_type= **regular**,
num_nodes= **0**, Trigger_count= **376**, Link to [RunsDB](#) using this TriggerList.
Created by Stevenkj on 13-Aug-2004_08:56
Description:

V13 Global trigger list requested by the Trigger Board.

Changes from global_CMT-13.11:

Major L3 revisions

- **JT**
 - JT4_HT_LM3_2TAM -> JT4_HT_LM3_2LM0
- **DMU**
 - DMU4_2TAM_IMJ_VX - change upper mass limit to 2 TeV
- **QCD**
 - JT_L3M225 -> JT_L3M250
 - JT_L3M380 -> JT_L3M430
- **MUH**
 - MUH1_TK12 -> MUH1_TK12_TLM12 (name change only)
 - MUH2_LM3_TK12 -> MUH2_LM6_TK12
 - MUH3_LM3_TK10 -> MUH3_LM6_TK12
 - MUH4 -> drop suite
 - MUH6_TK10 -> MUH6_TK12_TLM12
 - MUH7_TK10 -> MUH7_TK12
- **TAU**
 - TAU2_NN10 -> TAU2_2NN10_NN
- **EM**
 - Tightning of EM triggers
 - T7SHT8_M10 -> T7SHT8_M15
 - SHT8_ITK10 -> SHT10_ITK10
 - IT7SHT8 -> IT10SHT10
 - SHT15_M15 -> SHT15_M25
 - T13L15 -> T13SH15

Done

Report: global CalMuon-13.21 (2)

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http://d0db.fnal.gov/trigddb/cgi/tdb_report_element.py?function=Trigger+List&intnam=

TriggerMeister's Webp... TrigDb DAQ Shifters' Page My Yahoo! Redhat trig tabs beam status

Group 1 [allcrates / 1](#) [regular 0](#)

L1 Cal Trigger Tower Programming (L1Dialog): [em11](#) [em3](#) [em6](#) [em9](#) [jt3](#) [jt5](#) [jt7eta1.8](#) [null](#)

L1 detector Neotypes: [CFT/CPS cft/2.00](#) [Calorimeter emcount/1.00](#) [Calorimeter jetcount/1.00](#) [Muon muo/2.00](#) [Special \(Named\) And/Or specterm/1.00](#)

L2 filters: [none](#) [EM](#) [EM](#) [EM](#) [EM](#) [EM](#) [EM](#) [ETA](#) [TRACK](#) [EM](#) [EM](#) [EM](#) [ETA](#) [TRACK](#) [EM](#) [HT](#) [EM](#) [RANDOMPASS](#) [EM](#) [ETA](#) [TRACK](#) [E](#)

L2 tools: [EM\(0.6,0,0,0,0,0,1,6,0,none,5,0,3,3,50\) / 1](#)

[EM\(0,120,999,999,999,999,1,1,0,none,5,0,3,3,50\) / 1](#) [TRACK\(0.5,PTCTT,0,0, / 1](#)

[EM\(0,120,999,999,999,999,1,1,1,TRACK\(0,10,0,0,0,TRACK\(0.5,PTCTT,0,0,0,32,0\)\),5,0,3,3,50\) / 1](#) [TRACK\(0.5,PTCTT,1,0, / 1](#)

[EM\(0,120,999,999,999,999,1,1,1,TRACK\(0,10,0,0,0,TRACK\(0.5,PTCTT,1,0,0,32,0\)\),5,0,3,3,50\) / 1](#) [COMMISSION / 1](#)

[EM\(0,120,999,999,999,999,1,1,1,TRACK\(0.5,0,0,0,TRACK\(0.5,PTCTT,0,0,0,32,0\)\),5,0,3,3,50\) / 1](#) [TRACK\(0.3,PTCTT,1,1, / 1](#)

[EM\(0,120,999,999,999,999,1,1,1,TRACK\(0.3,0,0,0,TRACK\(0.3,PTCTT,1,1,0,32,0\)\),5,0,3,3,50\) / 1](#)

[EM\(0,120,999,999,999,999,1,1,1,TRACK\(0.5,0,0,0,TRACK\(0.5,PTCTT,1,0,0,32,0\)\),5,0,3,3,50\) / 1](#) [TRACK\(0.3,PTCTT,0,0, / 1](#)

[EM\(0,120,999,999,999,999,1,1,1,TRACK\(0.3,0,0,0,TRACK\(0.3,PTCTT,0,0,0,32,0\)\),5,0,3,3,50\) / 1](#) [JET\(0.5.\) / 1](#)

[MJT\(0,10.\) / 1](#) [JET\(0,10.\) / 1](#)

[TRACK\(0,10,PTTRACK,0,0,0,30,0.\) / 1](#)

L3 filters: [PassFraction](#) [Ele](#) [mp](#) [Ele](#) [Ele](#) [Ele](#) [Ele](#) [Ele](#) [MEt](#) [Ele](#) [Ele](#) [Track](#) [Ele](#) [Ele](#) [Hta](#) [Jet](#)

[Ele](#) [Hta](#) [Jet](#) [Jet](#) [Ele](#) [Ht](#) [Jet](#) [Ele](#) [Ele](#) [Ele](#) [Ele](#) [Ele](#) [Ele](#) [Ele](#) [Ele](#) [Ele](#)

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[InvMass](#) [InvMass](#) [mp](#) [Ele](#) [Ele](#) [Ele](#) [Ele](#) [CFTVertex](#) [InvMass](#) [Track](#) [mp](#) [PhysIP](#) [IP](#) [Muon](#) [IP](#)

[IP](#) [Track](#) [mp](#) [Muon](#) [Muon](#) [Jet](#) [Muon](#) [Track](#) [Track](#) [Track](#) [Track](#) [Track](#) [mp](#) [Muon](#) [InvMass](#)

Done

Report: global CalMuon-13.21 (3)

File Edit View Go Bookmarks Tools Help			
http://d0db.fnal.gov/trigdb/cgi/tdb_report_element.py?function=Trigger+List&IntName=global_CMT&IntVersion=13.21			
TriggerMeister's Webp... TrigDb DAQ Shifters' Page My Yahoo! Redhat trig tabs beam status			
0	SRTOOLS ONLINE / 5	This trigger definition includes a set of tools required by Level 3 ScriptRunner (a run configuration, an error handling tool and a geometry tool). Because it includes 'null' scripts at L1 used by general programming instructions to Level 3 for this configuration to be listed before any trigger specific tools or filters in the element. This version has the error handling tool	SRtools_online / 5
<p>The following triggers belong to the same Exposure Group.</p> <p>They share Device Group = allcrates / 1 and Exposure related L1 And/OR Terms: [ALiveBX & NOT(ASkip0) & NOT(Acaltc00)]</p>			
1(1)	min_bias_nim_NCU / 1	requires beam crossing and N/S luminosity monitors above threshold in coincidence and NOT unsuppressed Calorimeter read out. This is the same as min_bias_NCU with the nim t	Afastz_ncu / 1 none / 1 pf1 / 1
2(2)	min_bias_vme_NCU / 1	requires beam crossing and N/S luminosity monitors above threshold in coincidence and NOT unsuppressed Calorimeter read out. This is the min_bias_NCU that uses run I electron	Afastz_VME_ncu / 1 none / 1 pf1 / 1
3(3)	zero_bias_NCU / 2	requires beam crossing (an accelerator condition) and NOT unsuppressed Calorimeter read out	ALiveBX_ncu / 1 none / 1 pf1 / 1
4(4)	L1MU_DOWNLOAD / 10	Not a real trigger; For download purposes only.	L1Mu_download / 10 none / 1 pf1 / 1
5(5)	L1CTT_DOWNLOAD / 10	Not a real trigger; For download purposes only. Includes veto on cal unsuppressed.	L1CTT_download / 9 none / 1 pf1 / 1
6(6)	E1_SHT22 / 1	L1: one calorimeter EM trigger tower with Et>11 GeV. Veto on cal_unsuppressed condition. L2: Requires a standard L2 EM cluster with a threshold >= 15 GeV. L3: The trigger bi	CEM(1,11)_ncu / 1 L2CALEM(15,x) / 2 mp17000_Ele(ELE_NLV_SHT,1,22,0,3,6,-9
7	E1_SH30 / 2	L1: one calorimeter EM trigger tower with Et>11 GeV. Veto on cal_unsuppressed condition. L2: Requires a standard L2 EM cluster with a threshold >= 15 GeV. L3: The trigger bi	mp17000_Ele(ELE_NLV_SH,1,30,0,3,6,-99
8	E1_L70 / 1	L1: one calorimeter EM trigger tower with Et>11 GeV. Veto on cal_unsuppressed condition. L2: Requires a standard L2 EM cluster with a threshold >= 15 GeV. L3: The trigger bi	mp17000_Ele(ELE_NLV,1,70,0,3,6,-99,99
9	E1_NC90 / 2	L1: one calorimeter EM trigger tower with Et>11 GeV. Veto on cal_unsuppressed condition. L2: Requires a standard L2 EM cluster with a threshold >= 15 GeV. L3: The trigger bi	mp17000_Ele(ELE_NLV_NC,1,90,0,3,6,-95
10	E1_SHT15_M25 / 1	L1: one calorimeter EM trigger tower with Et>11 GeV. Veto on cal_unsuppressed condition. L2: Requires a standard L2 EM cluster with a threshold >= 15 GeV. L3: The trigger bi	mp17000_Ele(ELE_NLV_SHT,1,15,0,3,6,-9
11	E1_L30_M25 / 1	L1: one calorimeter EM trigger tower with Et>11 GeV. Veto on cal_unsuppressed condition. L2: Requires a standard L2 EM cluster with a threshold >= 15 GeV. L3: The trigger bi	Ele(ELE_NLV,1,30,0,3,6,-99,99)_MEt(Cal
Done			

Two Triggers

- zero_bias **in every physics Trigger List**
 - Level 1 only trigger
 - Requiring NEOTERM ALiveBX
 - An accelerator based trigger
 - true on each of the 36 beam crossings of a single turn of the accelerator
 - About 1.7 M times per second
 - Used to cross check the luminosity measurement and trigger system functionality
 - Really is unbiased
- min_bias ('minimum biased')
 - Level 1 only trigger
 - requiring NEOTERM 'Afastz'
 - (and ALiveBX and ASkip0) – every trigger
 - Based on Luminosity monitor:
 - North, South scintillator array on beamline
 - Requires N and S pulse heights above threshold in timing coincidence
 - Gives a quick measure of the z vertex
 - Necessary to measure luminosity
 - Is undoubtedly biased physics-wise

Example:

Trigger MWTL_M3_IMM_2T / 2

The screenshot shows two browser windows. The top window, titled "Trigger List Report - Netscape", displays a table of triggers. The bottom window, titled "Trigger Name(s) Report - Netscape", shows the details for the trigger "MWTL_M3_IMM_2T / 2".

Trigger ID	Trigger Name	Description
146(43)	MUW A L2M3 L3L15 / 2	L1: NOT Cal unsuppressed readout and 'a' region (all) single muon with tight scintillator and loose wire requirements. L2: Medium quality muon candidate with pt>3 GeV. L3: Require a track matched muon isolated from jets plus one additional track.
147(44)	MUW L2M0 2TK3 MM / 3	L1: NOT Cal unsuppressed readout and 'w' region (CFT) muon scintillator trigger and loose muon wire requirement. L2: Medium quality muon candidate. L3: set trigger must match a muon.
148(45)	MU A L2M3 L3L15 / 2	L1: NOT Cal unsuppressed readout and 'a' region (all) muon scintillator trigger. L2: Medium quality muon candidate with pt>3 GeV. L3: Loose muon with pt>15 GeV.
149(46)	MWTL M3 IMM 2T / 2	L1: NOT Cal unsuppressed readout and 'w' region (CFT) muon with tight scintillator and loose wire requirements. L2: Medium quality muon candidate with pt>3 GeV. L3: Require a track matched muon isolated from jets plus one additional track.

Trigger Name(s) Report

Trigger Name input: [intname , intversion] = [MWTL_M3_IMM_2T , 2]

TRIGGER Name/Version= MWTL_M3_IMM_2T / 2, Use_Status= **used** , Current_Status= **current** , created by toole on 19-May-2003

Description: L1: NOT Cal unsuppressed readout and 'w' region (CFT) muon with tight scintillator and loose wire requirements. L2: Medium quality muon candidate with pt>3 GeV. L3: Require a track matched muon isolated from jets plus one additional track.

LEVEL	SCRIPT Name / Description
1	Level 1 SCRIPT Name/Version= mulptxwtlx ncu / 1 Description: A region=w (wide muon region) single muon trigger with tight scintillator and loose wire requirements and NOT Calorimeter unsuppressed readout.
2	Level 2 SCRIPT Name/Version= MUON(0,3,,2,0,0,MUON(0,0,5,0)) / 1 Description: pass events with at least one muon found with pT>3 GeV meeting MEDIUM quality(=2) requirements (no region requirement).
3	Level 3 SCRIPT Name/Version= L3FTrack(PhTrk5,2,5,,1,,10,0) L3FdR(MUON CM 5,SCJET 8,,7) / 1 Description: Requires two tracks with pt>5GeV. Also require a central match muon isolated from jets.

Example:

Trigger MWTL_M3_IMM_2T / 2

Trigger Script(s) Report - Netscape

Trigger Script(s) Report

Trigger Level: [slevel] = [13]
 Script input: [insname , inversion] = [L3FTRACK(PHTRK5,2,5.,1.,10,0)_L3FDR(MUON_CM_5,SCJET_8.,7) , 1]

SCRIPT NAME= [L3FTrack\(PhTrk5,2,5.,1.,10,0\)_L3Fdr\(MUON_CM_5,SCJET_8.,7\) / 1](#) , Version= 1 , Use_Status= used , Current_Status= current , created by toole on 19-May-2003

Description: **Requires two tracks with $p_t > 5 \text{ GeV}$. Also require a central match muon isolated from jets.**

ORDER	Includes Level 3 Filter TERM(s):
1	Term Name: L3FTrack(PhTrk5,2,5.,1.,10,0) / 1
2	Term Name: L3Fdr(MUON_CM_5,SCJET_8.,7) / 2

Document: Done (1.061 secs)

Trigger Level 3 Term Report - Netscape

Trigger Level 3 Term Report

Term Name/Version= [L3Fdr\(MUON_CM_5,SCJET_8.,7\) / 2](#) , Use_Status= used , Current_Status= current , created by toole on 19-May-2003_10:04

Description: **require a muon with a central track match to be isolated by $dR > .7$ from all jet candidates with $E_t > 8 \text{ GeV}$.**

is based on a Level 3 OBJECT name= [L3Fdr](#) , CVS_package= 13filters , Version= p15

Order	Parameter	Type	Value	PVTVersion	Default
1	key1	filter	L3FMuon(MUON_CM,1,0.,0.,2.5,0.,5.,LOOSE)	1	-
2	key2	filter	L3FJet(SC7JET8_PV3_NLC,0,8.,0.,3.)	1	-
3	DR	float	.7	-	.7

Document: Done (1.192 secs)

L3: Whaaaaat's that ?

- Mark and Pass (special filter)
 - A Level 3 Filter designed to create samples for L3 trigger analysis (not for physics analysis)
 - Has one argument: `pass_1_of_n`
 - Action: puts 1 of every n events passing through it into the inclusive 'monitor' stream
 - Events written to the monitor stream are not intended for physics analysis
 - No luminosity accounting for monitor stream
 - Events recorded exclusively to the monitor stream events
 - do not get registered in the SAM event catalog
 - Cannot use 'pick events' utility to get them
 - Level 3 scripts using this filter have `mp*` in their name, where `pass_1_of_n = *`
- Other shortnames:
 - 'ps*' -- for L3FPrescale, `prescale = *`
 - 'pf*' -- for L3FPassFraction, `fraction = *`

Trigger List Rules ...

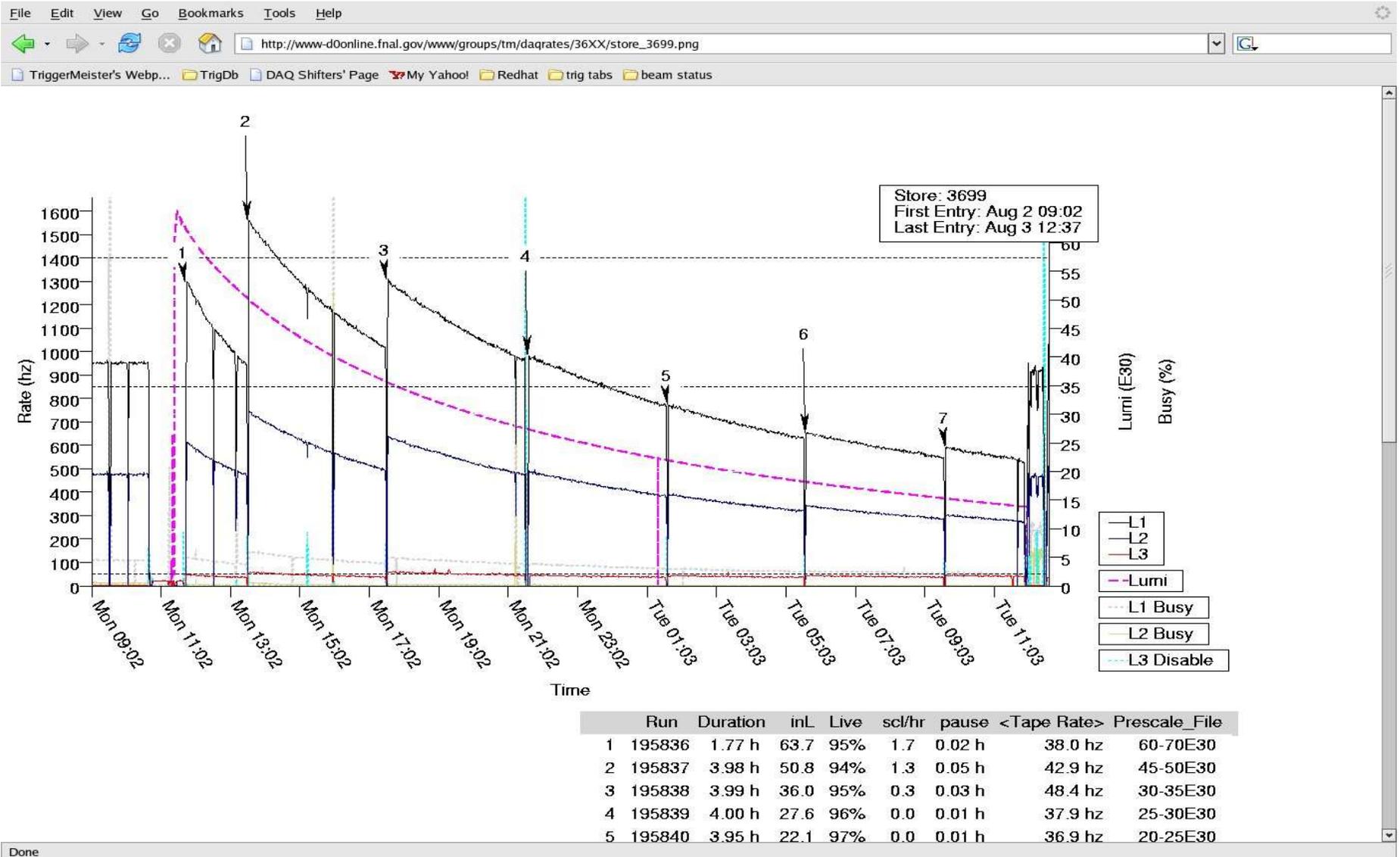
Examples of rules for valid Triggers, Lists...

- all Trigger Names must
 - be unique (in that Trigger List)
 - $\text{len}(\text{TriggerName}) \leq 16$ (thumbnail)
 - cannot contain special characters
- cannot use more than 4 Level1 Calorimeter EM or JET thresholds
- cannot use more than 32 L1 muon terms from the set of 256 valid terms
- cannot use more than 128 unique L1L2 bits
- L3 filters and tools mustn't use different versions of tools of the same name
- L3 filters and tools may call other tools, but tools may not call filters (not true at L2)
- L3 tool names must conform to SR parsing rules
- ...

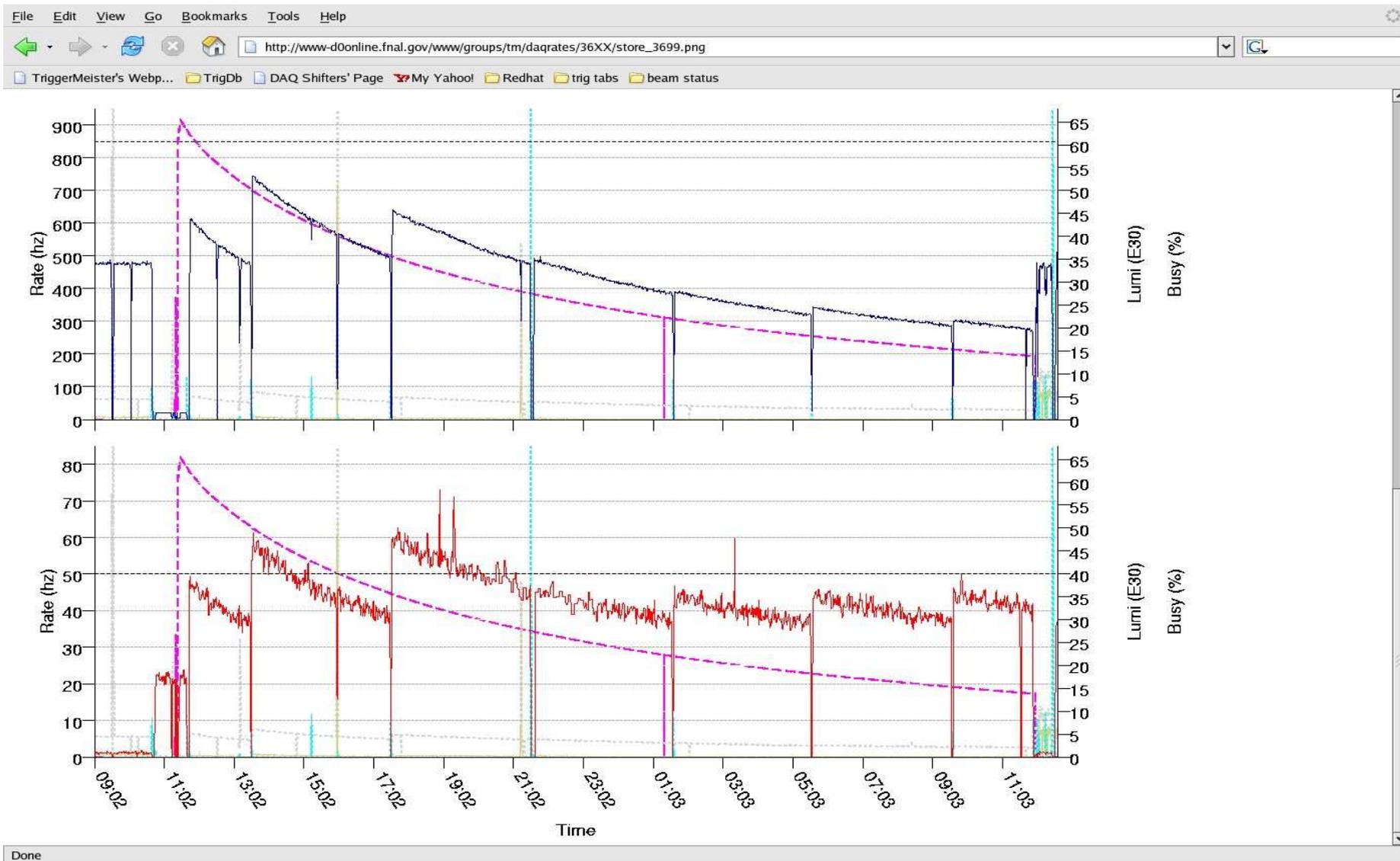
Many rules checked upon db entry, but the 'xml' generator checks many features as well ...

Monitoring Tools

DAQ Rates (1)



DAQ Rates (2)



DAQ monitor - Spec trigger

File Options **Help**

Overview | **L1 Trigger** | Col/Router | DataLogger | SDAQ | Distributor | DSM | L3 Filter

L1 Trigger Monitor Tue Jun 1 11:31:00 2004 Display Mode natural unit ▼

Spec Trigger | Trig Details | Exp Group | Global | L1 Qualifiers | And/Or Term | Geo Sector | Strip Charts

Specific Trigger Display

Trig#	Trig Name	Fired (Hz)	And/Or Fired (Hz)	Exposed (Hz)	Pre
0	Afastz_ncu	0.962	881801.807	1.154	
1	ALiveBX_ncu	0.577	1712633.593	0.577	
2	L1Mu_download	0.0	0.0	0.0	
3	L1CTT_download	0.0	0.0	0.0	
4	CEM(1,3)_ncu	0.0	19836.959	19.43	
5	CEM(1,6)_ncu	0.0	1221.991	60.984	
6	CEM(1,11)_ncu	0.0	113.888	1829.331	
7	CEM(1,9)_ncu	0.0	251.247	803.374	
8	TK(2,3.)_CEM(2,3)_ncu	0.0	811.454	97.151	
9	CEM(1,11)_ncu^2	110.233	113.888	1656938.361	
10	CEM(2,6)_ncu	80.799	84.839	1656938.361	
11	CEM(2,3)CEM(1,9)_ncu	139.475	143.707	1656938.361	
12	K(1,10.)_CEM(1,9)_ncu	51.365	51.558	1656938.361	
13	CEM(2,3)CEM(1,6)_ncu	96.382	98.306	1656938.361	
14	S(1,10.)_CEM(1,6)_ncu	45.786	46.171	1656938.361	
15	CEM(2,3)CEM(1,6)_ncu	201.998	207.192	1656938.361	
16	M(2,3)CEM(1,6)_ncu^2	201.998	207.192	1656938.361	
17	IS(1,5.)_CEM(1,6)_ncu	65.409	67.525	1656938.361	

DAQ Monitor – L3 Filter

File Options Help

Overview | L1 Trigger | Col/Router | DataLogger | SDAQ | Distributor | DSM | **L3 Filter**

L3 Filter last updated Tue Jun 1 11:48:14 2004

Display Mode Integration Mode

L2 Name	L1 bit	L3 bit	L3 Script Name	# called	# passed	# forced	# prescaled	L3 Filter Name	# called	# passed
1^min_bias_NCU	0	2	min_bias_NCU	5140	5140	0	0	t1s1_PassFraction	5140	5140
2^zero_bias_NCU	1	3	zero_bias_NCU	4373	4373	0	0	t2s1_PassFraction	4373	4373
IU_DOWNLOAD	2									
IT_DOWNLOAD	3									
5^EM5	4	6	EM5	2394	422	0	0	t5s1_Ele	2394	422
6^E456_ELE_MP	5	8	CEM6	393	393	0	0	t7s1_PassFraction	393	393
		7	E456_ELE_MP	393	0	0	0	t6s1_mp2500	393	393
								t6s2_Ele	393	0
								t6s3_MEt	0	0
		9	EM9	393	93	0	0	t8s1_Ele	393	93
9^EM15	6	10	EM15	1206	394	0	0	t9s1_Ele	1206	394
10^EM12	7	11	EM12	1187	412	0	0	t10s1_Ele	1187	412
11^E78_ELE_MP	8	13	2CEM3_2TK3	481	481	0	0	t12s1_PassFraction	481	481
		12	E78_ELE_MP	481	0	0	0	t11s10_Ele	0	0
								t11s11_Ele	0	0
								t11s12_Jet	0	0
							t11s13_Ht	0	0	
							t11s13s1_Jet	0	0	

LmTrigger (1)

File View Refresh *Help*

Trigger Rate Ratios	Trigger Status	Server Status			
---------------------	----------------	---------------	--	--	--

Ratios or Rates ? **rate** —

Luminosity Info

Luminosity (E30)	27.83
Proton Halo (Hz)	46486.29
Pbar Halo (Hz)	3242.77

Level 3 Event Rates (Hz)

Total	624.30
Incomplete	
Accept	
Disable	

Run Number	L3 Nodes	Configname	Configvers
193646	144	global_CMT	12.37

Level 1 Rates Ratio Axis set Auto ▼

Level 2 Rates Ratio Axis set Auto ▼

Level 3 Rates Ratio Axis set Auto ▼

0 100 200

0 50 100 150

0 1 2 3

4/5
Total Luminosity (E30) 27.8471
LBN 3398291
Monit SN 87196
HV set to 100%
Jun 01 12:05:34

Status: Refreshing

LmTrigger (2)

File View Refresh *Help*

Trigger Rate Ratios | Trigger Status | Server Status

Exposure Group:

Incomplete threshold:

Luminosity Info

Luminosity (E30)	27.81
Proton Halo (Hz)	46643.74
Pbar Halo (Hz)	3419.45

Level 3 Event Rates (Hz)

Total	580.57
Incomplete	0.00
Accept	
Disable	0.00

Exposure Group	Run Number	L3 Nodes
0	193646	144
1	193646	144
2	193646	144

Incomplete threshold:

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
L1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
L2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Muon	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Cal	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
CFT	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
SMT	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
STT	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7

L1 L2 L3 Axis set

L1 Bit	L2 Bit	L3 Bit	L3 Trigger	L1 Prescale	L1 Rate (Hz)	L2 Rate (Hz)	L3 Rate (Hz)	L1 Lum	L1 XS	L2 XS
0	0	2	min_bias_NCU	1540000	0.46	0.46	0.34	0.00	26938.20	26938.20
1	1	3	zero_bias_NCU	3400001	0.32	0.32	0.33	0.00	---	---
2	2			1	0.00	0.00	0.00	0.00	---	---
3	3			1	0.00	0.00	0.00	0.00	---	---
4	4	6	EM5	76707	0.19	0.19	0.03	0.00	613.81	613.81
5	5	7	E456_ELE_MP	28070	0.00	0.00	0.00	0.00	0.00	0.00
5	5	8	CEM6	28070	0.00	0.00	0.04	0.00	0.00	0.00
5	5	9	EM9	28070	0.00	0.00	0.04	0.00	0.00	0.00
6	6	10	EM15	902	0.05	0.05	0.04	0.03	2.03	2.03
7	7	11	EM12	2009	0.11	0.11	0.00	0.01	9.11	9.11
8	8	12	E78_ELE_MP	17010	0.03	0.03	0.00	0.00	19.20	19.20
8	8	13	2CEM3_2TK3	17010	0.03	0.03	0.01	0.00	19.20	19.20
9	9	14	E1_ELE_MP	1	105.81	86.24	0.00	23.95	4.42	3.60
9	9	15	E1_SHT20	1	105.81	86.24	2.19	23.95	4.42	3.60
9	9	16	E1_SH30	1	105.81	86.24	1.03	23.95	4.42	3.60
9	9	17	E1_L50	1	105.81	86.24	0.15	23.95	4.42	3.60

Total Luminosity (E30) 27.8116

LBN 3398291

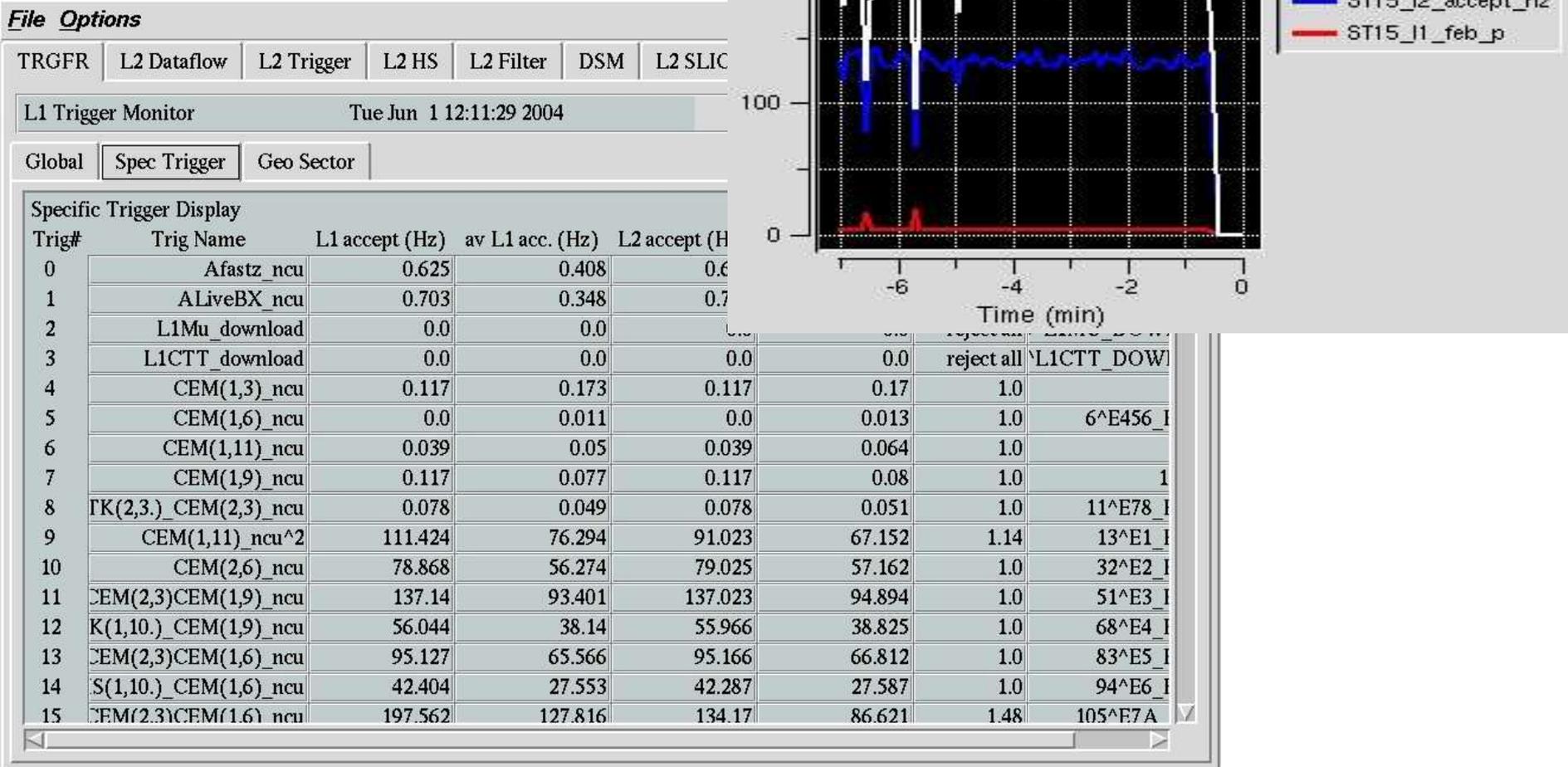
Monit SN 87201

HV set to 100%

Jun 01 12:06:00

Status:

L2 Monitor Guis



Prescale file

File Edit View Go Bookmarks Tools Help

http://www.d0Online.fnal.gov/www/groups/trigger/official/global_CMT-13.21-prescales/prescales.html

TriggerMeister's Webp... TrigDb DAQ Shifters' Page My Yahoo! Redhat trig tabs beam status

L1 Trigger Term	L3 trigger Name	00-10E30	10-15E30	15-20E30	20-25E30	25-30E30	30-35E30	35-40E30	40-45E30	45-50E30	50-55E30	55-60E30	60-70E30
Afastz_ncu	min_bias_nim_NCU	275000	550000	775000	1100000	1350000	1400000	1500000	1600000	1700000	1800000	1900000	2000000
Afastz_VME_ncu	min_bias_vme_NCU	0	0	0	0	0	0	0	0	0	0	0	0
ALiveBX_ncu	zero_bias_NCU	3400001	3400001	3400001	3400001	3400001	3400001	3400001	3400001	3400001	3400001	3400001	3400001
L1Mu_download	L1MU_DOWNLOAD	0	0	0	0	0	0	0	0	0	0	0	0
L1CTT_download	L1CTT_DOWNLOAD	0	0	0	0	0	0	0	0	0	0	0	0
CEM(1,11)_ncu	E1_SHT22	1	1	1	1	1	1	1	1	1	1	1	1
CEM(2,6)_ncu	E2_SHT22	1	1	1	1	1	1	1	1	1	1	1	1
CEM(2,3)CEM(1,9)_ncu	E3_SHT22	1	1	1	1	1	1	1	1	1	1	1	0
CEM(1,11)_ncu^2	E4_SHT22	1	1	1	1	1	1	1	1	1	1	1	1
TTK(1,10.)_CEM(1,9)_ncu	E5_SHT20	1	1	1	1	1	1	1	1	1	1	1	1
TTK(1,10.)_CEM(1,9)_ncu^2	E6_SHT20	1	1	1	1	1	1	1	1	1	1	1	1
TTK(1,10.)_CEM(1,9)_ncu^3	E7_SHT20	1	1	1	1	1	1	1	1	1	1	1	1
TIS(1,10.)_CEM(1,6)_ncu	E8_SHT20	1	1	1	1	1	1	1	1	1	1	1	1
TIS(1,10.)_CEM(1,6)_ncu^2	E9_SHT20	1	1	1	1	1	1	1	1	1	1	1	1
CEM(1,11)_ncu^3	E20_2SH10	1	1	1	1	1	1	1	1	1	1	1	1
CEM(2,6)_ncu^2	E21_2L15_SH15	1	1	1	1	1	1	1	1	1	1	1	1
CEM(2,3)CEM(1,9)_ncu^2	E22_2L15_SH15	1	1	1	1	1	1	1	1	1	1	1	0
CEM(2,6)_ncu^3	E23_2T5SH5	1	1	1	1	1	1	1	1	1	1	1	1
CEM(2,3)CEM(1,9)_ncu^3	E24_2T5SH5	1	1	1	1	1	1	1	1	1	1	1	0
CEM(2,3)CEM(1,9)_ncu^4	E25_2T5SH5	1	1	1	1	1	1	1	1	1	1	1	0
TES(2,3.)_CEM(2,3)_ncu	E26_2RL3_RT3_RL5	1	1	1	1	1	1	1	1	1	1	1	1
TES(2,3.)_CEM(2,3)_ncu^2	E27_2RL3_RT3_RL5	1	1	1	1	1	1	1	1	1	1	1	1
TIS(2,5.)_CEM(2,3)_ncu	E28_2RL3_RT3_RL5	1	1	1	1	1	1	1	1	1	1	0	0
TIS(2,5.)_CEM(2,3)_ncu^2	E29_2RL3_RT3_RL5	1	1	1	1	1	1	1	1	1	1	0	0
TTK(2,3)TTK(1,5.)_CEM(2,3)CEM(1,6)_ncu	E30_2RL3_RT3_RL5	1	1	1	1	1	1	1	2	3	4	0	0
TTK(2,5)TIS(1,5.)_CEM(1,6)_ncu	ET1_SHT15_M25	1	1	1	1	1	1	1	1	0	0	0	0
TTK(2,5)TIS(1,5.)_CEM(1,6)_ncu^2	ET2_SHT15_M25	1	1	1	1	1	1	1	1	0	0	0	0
CJT(1,5)_ncu	JT_8TT	1562	9371	12495	15619	18743	54667	62476	70286	78095	85905	93714	246000
CJT(2,3)_ncu	JT_15TT	802	1202	1603	4008	4810	28058	32066	36074	40083	44091	48099	126261
CJT(2,5)_ncu	JT_25TT_NG	73	109	146	364	437	1020	1165	1311	1457	1602	1748	11472
CJT(3,5)_ncu	JT_65TT	1	2	2	6	7	16	18	21	23	25	28	162

Done

That's it!