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 unprescaled 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

L1FW: towers, tracks, correlations

L2FW: Combined objects (e, µ, j)

To L3 Farm

Detector

7 MHz

L1 Trigger

5-10 kHz

L2 Trigger

1000 Hz

CAL

L1CAL

L2Cal

Global L2

FPS

CPS

L1 CTT

L2PS

Muon

L1 Muon

L2STT

CFT

L2CFT

SMT

L1 FPD

L2 Muon

Muon FPD
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

```
<table>
<thead>
<tr>
<th>Trigger Name</th>
<th>Script</th>
<th>Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>E28_2T5SH5</td>
<td>L1</td>
<td>CEM(2,3)</td>
</tr>
<tr>
<td></td>
<td>L2</td>
<td>TIS(2,5)</td>
</tr>
<tr>
<td></td>
<td>L3</td>
<td>L2CALTRK(2,3,5,TIS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>L3FELE(ELE_NLV_SH_T5,2,5,...)</td>
</tr>
</tbody>
</table>
```
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:

```
   EM_MAX
   /   \
  /     \
L1Script
L2Script
L3Script

   2EM_HI
   /   \
  /     \
   

   3JET_HT
   /   \
  /     \
   logical
   TERMS
   (yes/no)

   MU_JET_HI
   /   \
  /     \
   
```
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

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

<table>
<thead>
<tr>
<th>order</th>
<th>name</th>
<th>type</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1     | Mult  | int  | Muon track multiplicity. Possible values:  
|       |       |      | • 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:  
|       |       |      | • px = 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:  
|       |       |      | • C — Central; |eta|<1.0 (central muon system only),  
|       |       |      | • W — Wide; |eta|<1.5 (CFT system coverage),  
|       |       |      | • A — All; |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:  
|       |       |      | • L — Loose,  
|       |       |      | • T — Tight,  
|       |       |      | • X — no requirement  
|       |       |      | • E — Experimental. |
| 5     | Wire  | string | Wire and scintillator quality (MTC10). Possible Values:  
|       |       |      | • L — Loose,  
|       |       |      | • T — Tight,  
|       |       |      | • X — no requirement  
|       |       |      | • E — Experimental. |
L1 CTT Trigger

REPORT: Neotypes and NeotermNs

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

Description: CFT/CPS terms: These terms are as described in DO Track and Preshower Trigger Level1 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.
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: mu2pt3wtx
  - 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 its 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
• **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
A ‘Term’ is a tool or filter with a distinct set of parameter = value pairs

‘Release Version’

P15.02.00 or pseudoversion
Trigger List History

Link off of Triggermeister page

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 \(\rightarrow\) JT4_HT_LM3_2LM0

- **DMU**
  - DMU4_2TAM_1ML_VX - change upper mass limit to 2 TeV

- **QCD**
  - JT_L3M225 \(\rightarrow\) JT_L3M250
  - JT_L3M380 \(\rightarrow\) JT_L3M430

- **MUH**
  - MUH1_TK12 \(\rightarrow\) MUH1_TK12_TLM12 (name change only)
  - MUH2_LM3_TK12 \(\rightarrow\) MUH2_LM6_TK12
  - MUH3_LM3_TK10 \(\rightarrow\) MUH3_LM6_TK12
  - MUH4 \(\rightarrow\) drop suite
  - MUH6_TK10 \(\rightarrow\) MUH6_TK12_TLM12
  - MUH7_TK10 \(\rightarrow\) MUH7_TK12

- **TAU**
  - TAU2_NN10 \(\rightarrow\) TAU2_2NN10_NN

- **EM**
  - Tightening of EM triggers
    - T7SHT8_M10 \(\rightarrow\) T7SHT8_M15
    - SHT8_2TFK10 \(\rightarrow\) SHT10_2TFK10
    - T7SHT8 \(\rightarrow\) T7SHT8_T10SHT10
    - SHT15_M15 \(\rightarrow\) SHT15_M25
    - T13L15 \(\rightarrow\) T13SHT15
    - L20_M25 \(\rightarrow\) L30_M25
Trailer List Report

Trigger List Name Input: [intname, inversion] = [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_runotype = data, L3_type = regular, num_nodes = 0, Trigger_count = 376, Link to RmsDB using this TriggerList.
Created by StevenK 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_LMJ_VX - change upper mass limit to 2 TeV
- QCD
  - JT_L3M225 --> JT_L3M250
  - JT_L3M380 --> JT_L3M430
- MUH
  - MUH1_TK12 --> MUH1_TK12_TL.M12 (name change only)
  - MUH2_LM3_TK12 --> MUH2_LM6_TK12
  - MUH3_LM3_TK10 --> MUH3_LM6_TK12
  - MUH4 --> drop suite
  - MUH6_TK10 --> MUH6_TK12_TL.M12
  - MUH7_TK10 --> MUH7_TK12
- TAU
  - TAU2_NN10 --> TAU2_2NN10_NN
- EM
  - Tightning of EM triggers
    - T7SHT8_M10 --> T7SHT8_M15
    - SHT8_TTK10 --> SHT10_TTK10
    - T7SHT8 --> T10SHT10
    - SHT15_M15 --> SHT15_M25
    - T13L15 --> T13S15
Report: global CalMuon-13.21 (2)
<table>
<thead>
<tr>
<th>Trigger</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>min_bias_nim_NCU</td>
<td>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 trigger.</td>
</tr>
<tr>
<td>min_bias_vme_NCU</td>
<td>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 trigger.</td>
</tr>
<tr>
<td>zero_bias_NCU</td>
<td>Requires beam crossing (an accelerator condition) and NOT unsuppressed Calorimeter read out.</td>
</tr>
<tr>
<td>L1MU_DOWNLOAD</td>
<td>Not a real trigger. For download purposes only.</td>
</tr>
<tr>
<td>LICCT_DOWNLOAD</td>
<td>Not a real trigger. For download purposes only. Includes veto on cal unsuppressed.</td>
</tr>
</tbody>
</table>

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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

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.

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>SCRIPT Name/Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>mu1ptxwtil x ncu / 1</td>
<td>A region='w' (wide muon region) single muon trigger with tight scintillator and loose wire requirements and NOT Calorimeter unsuppressed readout.</td>
</tr>
<tr>
<td>2</td>
<td>MUON(0.3,2.0,0,0,MUON(0,0,5,0)) / 1</td>
<td>pass events with at least one muon found with pT&gt;3 GeV meeting MEDIUM quality(=2) requirements (no region requirement).</td>
</tr>
<tr>
<td>3</td>
<td>L3FTrack(PhTrk5.2,5.1,10,0) L3FDr(MUON CM 5,SCJET_8,7) / 1</td>
<td>Requires two tracks with pt&gt;5GeV. Also require a central match muon isolated from jets.</td>
</tr>
</tbody>
</table>
Example: 

Trigger MWTL_M3_IMM_2T / 2

Trigger Script(s) Report

Trigger Level: [ slevel ] = [ B ]
Script input: [ insname , insversion ] = [ 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 pt>5GeV. Also require a central match muon isolated from jets.

<table>
<thead>
<tr>
<th>ORDER</th>
<th>Includes Level 3 Filter TERM(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Term Name: L3FTrack(PhTrk5,2,5,1,10,0) / 1</td>
</tr>
<tr>
<td>2</td>
<td>Term Name: L3FDr(MUON_CM_5,SCJET_8,7) / 2</td>
</tr>
</tbody>
</table>

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 Et>8 GeV.
is based on a Level 3 OBJECT name= L3FDr , CVS_package= l3filters , Version= p15

<table>
<thead>
<tr>
<th>Order</th>
<th>Parameter</th>
<th>Type</th>
<th>Value</th>
<th>PVTVersion</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>key1</td>
<td>filter</td>
<td>L3FMuon(MUON_CM_1,0,0,2.5,0,5,LOOSE)</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>key2</td>
<td>filter</td>
<td>L3FJet(SC7JET8_PV3_NLC,0,8,0,3,)</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>DR</td>
<td>float</td>
<td>.7</td>
<td>-</td>
<td>.7</td>
</tr>
</tbody>
</table>
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)
  - $\text{len(TriggerName)} \leq 16$ (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 monitor - Spec trigger

#### Specific Trigger Display

<table>
<thead>
<tr>
<th>Trig#</th>
<th>Trig Name</th>
<th>Fired (Hz)</th>
<th>And/Or Fired (Hz)</th>
<th>Exposed (Hz)</th>
<th>Pre</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Afastz_nceu</td>
<td>0.962</td>
<td>881801.807</td>
<td>1.154</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>ALiveBX_nceu</td>
<td>0.577</td>
<td>1712633.593</td>
<td>0.577</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>L1Mu_download</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>L1CTT_download</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>CEM(1,3)_ncu</td>
<td>0.0</td>
<td>19836.959</td>
<td>19.43</td>
<td></td>
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# DAQ Monitor – L3 Filter

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![Image of a table displaying data related to DAQ Monitor – L3 Filter](image-url)
LmTrigger (1)
LmTrigger (2)
L2 Monitor Guis

Specific Trigger Display

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That's it!