Trigger shifter tutorial

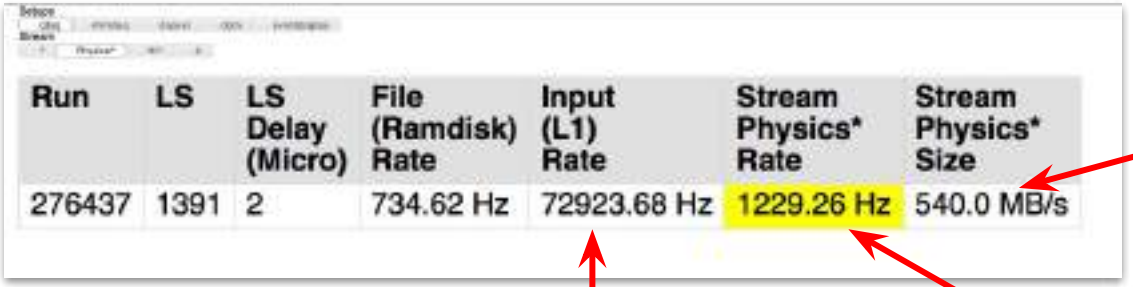
Monitoring, troubleshooting, and summary

Total Trigger Rates at DAQ

To see the Total L1 Rate at the TCDS & Stream Physics rate (out of HLT)

- This includes Calibration (~100 Hz) and Random Triggers in the L1 Rate
- POST-Deadtime

On the trigger desktop use: http://es-cdaq.cms/sc/ratemeter.html



Run	LS	LS Delay (Micro)	File (Ramdisk) Rate	Input (L1) Rate	Stream Physics* Rate	Stream Physics* Size
276437	1391	2	734.62 Hz	72923.68 Hz	1229.26 Hz	540.0 MB/s

Should be below 1 GB/s during normal running

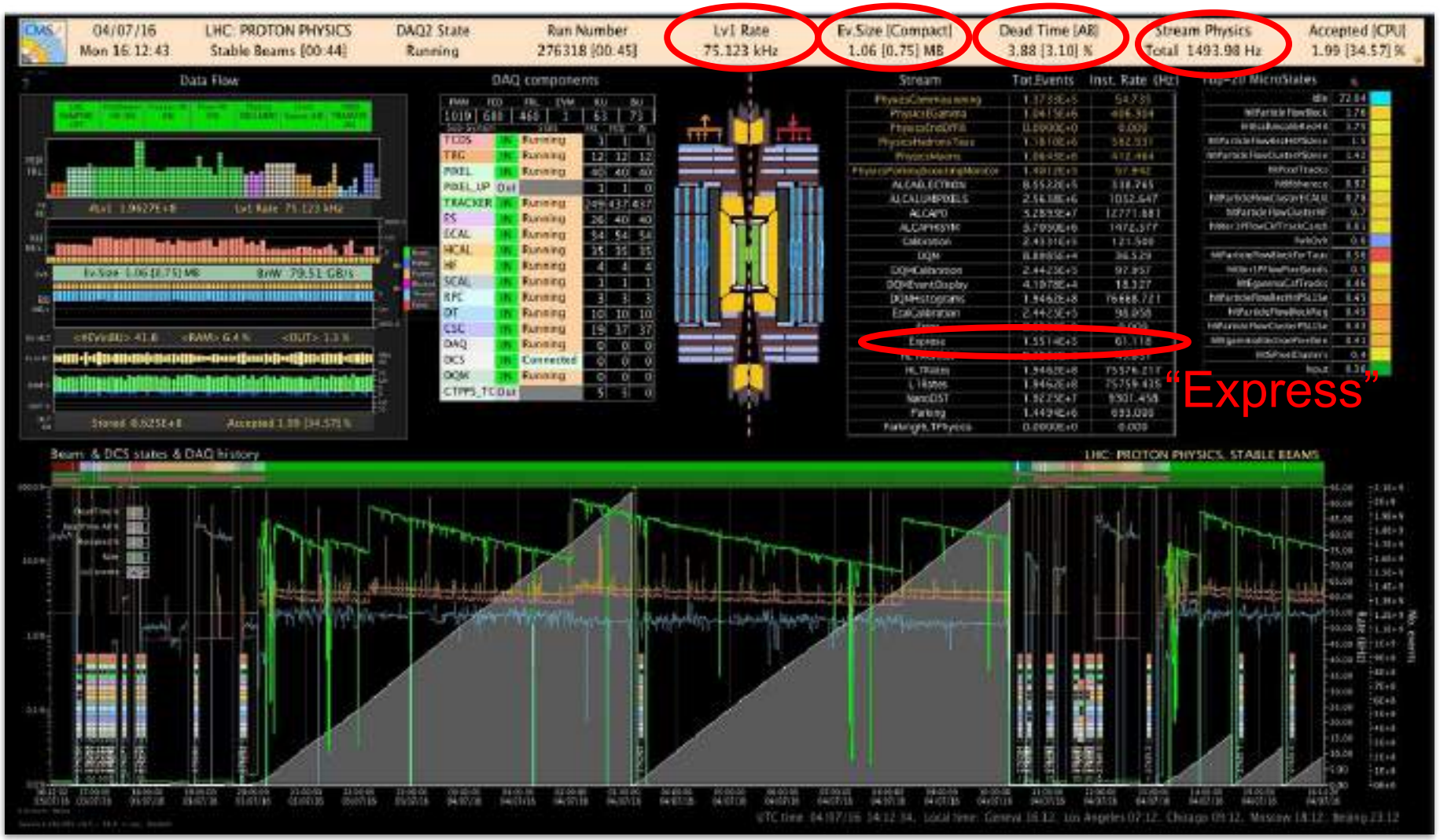
Post-deadtime Level-1 trigger rate

Output rate of main HLT stream

On the DAQ desktop (http://cmsdaqweb.cms/local/daqview/cdaq/DAQ.html):

Readout rates at TCDS (CPM), by subsystem

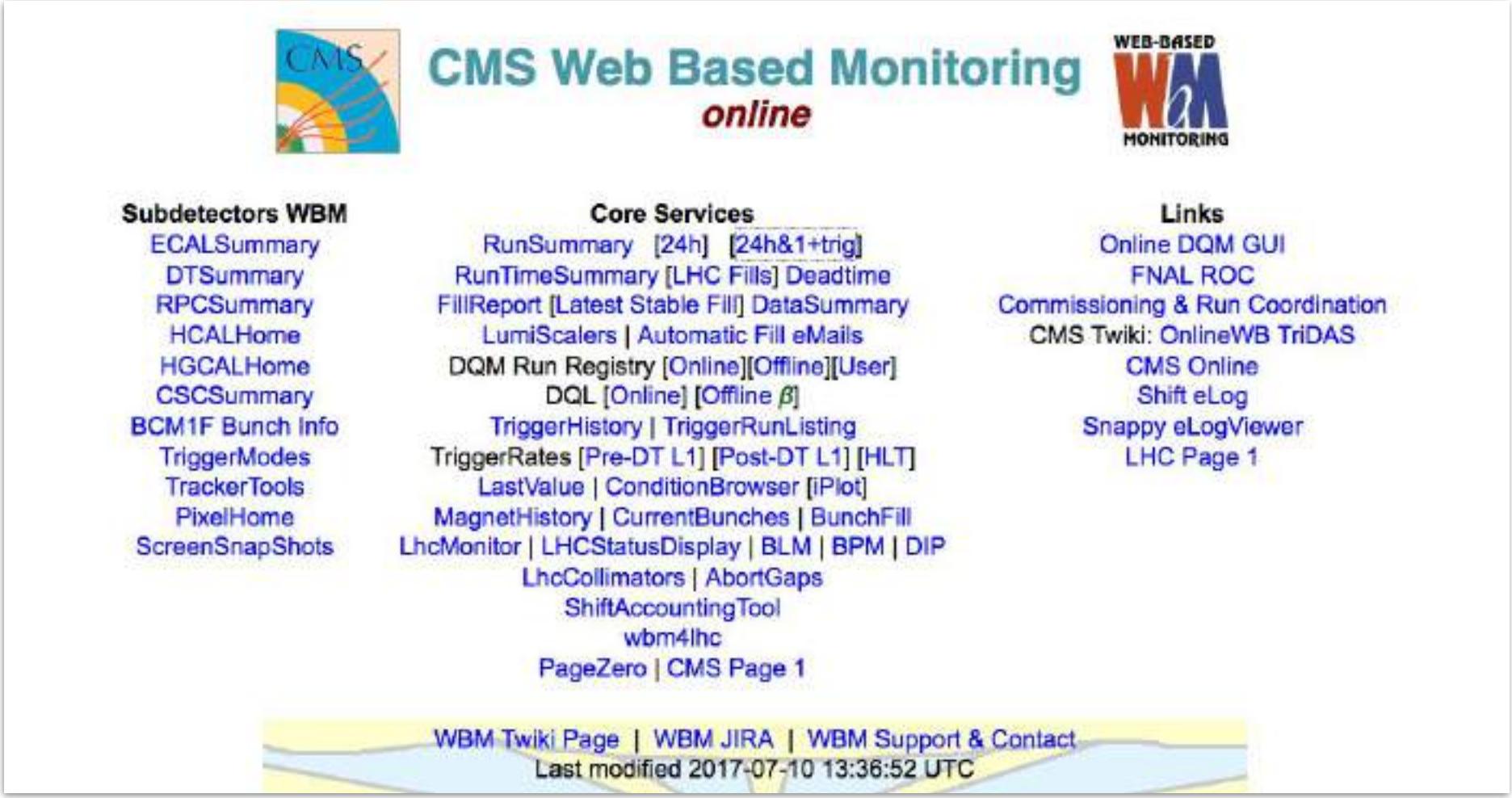
HLT Rates to check



https://cmsonline.cern.ch/daqStatusSCX/aDAQmon/DAQstatusGre.jpg

Web-Based Monitoring

Aggregates a lot of useful monitoring tools.



https://cmswbm.cern.ch

WBM Stream Summary

Sometimes HLT rates are not visible on the DAQ Status page…

WBM Stream Summary

Run Summary

All times are in UTC.
TRIGGERS and L1 triggers numbers are the total pre-deadtime triggers, including Calibration and Random ones.

RUN	LUMI_NB_LIVE_DELIV	SEQUENCE	TRIGGER_MODE	L1_KEY	HLT_KEY	STARTTIME	STOPTIME	TRIGGERS	BFIELD	TIER0	COMPONENTS
306125	567.[illegible] 729583 588.[illegible]	GLOBAL-RUN tagpro	l1_hlt_collisions2017/v315	l1_trg_collisions2017/v136	/cdaq/physics/Run2017/2e34/v4.1.8/HLT/V3	2017.11.03 14:45:28	2017.11.04 10:12:01	4374674636	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
[illegible]	[illegible] 653538 46.444 625000	GLOBAL-RUN tagpro	l1_hlt_collisions2017/v315	l1_trg_collisions2017/v136	/cdaq/physics/Run2017/2e34/v4.1.8/HLT/V3	2017.11.03 13:52:33	2017.11.03 14:42:19	222463866	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306121	29.198 343750 34.189 604899	GLOBAL-RUN tagpro	l1_hlt_collisions2017/v315	l1_trg_collisions2017/v135	/cdaq/physics/Run2017/2e34/v4.1.8/HLT/V3	2017.11.03 12:50:27	2017.11.03 13:51:18	189940704	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306120	0.000000 0.000000	GLOBAL-RUN tagpro	l1_hlt_circulating2017/v133	l1_trg_circulating2017/v98	/cdaq/special/Circulating2017/v3.2.0/HLT/V1	2017.11.03 12:07:58	2017.11.03 12:53:09	13679587	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306119	0.000000 0.000000	GLOBAL-RUN tagpro	l1_hlt_collisions2017/v315	l1_trg_collisions2017/v135	/cdaq/physics/Run2017/2e34/v4.1.8/HLT/V3	2017.11.03 11:00:41	2017.11.03 11:08:05	203234	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306118	0.000000 0.000000	GLOBAL-RUN tagpro	l1_hlt_circulating2017/v133	l1_trg_circulating2017/v98	/cdaq/special/Circulating2017/v3.2.0/HLT/V1	2017.11.03 10:56:18	2017.11.03 10:58:25	267266	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306116	0.000000 0.000000	GLOBAL-RUN tagpro	l1_hlt_collisions2017/v314	l1_trg_collisions2017/v134	/cdaq/physics/Run2017/2e34/v4.1.8/HLT/V3	2017.11.03 10:38:24	2017.11.03 10:44:07	214243	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306115	0.000000 0.000000	GLOBAL-RUN tagpro	l1_hlt_collisions2017/v314	l1_trg_collisions2017/v134	/cdaq/physics/Run2017/2e34/v4.1.8/HLT/V3	2017.11.03 10:30:03	2017.11.03 10:36:02	190180	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306114	0.000000 0.000000	GLOBAL-RUN tagpro	l1_hlt_circulating2017/v132	l1_trg_circulating2017/v98	/cdaq/special/Circulating2017/v3.2.0/HLT/V1	2017.11.03 10:22:59	2017.11.03 10:29:11	662247	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306113	0.000000 0.000000	GLOBAL-RUN tagpro	l1_hlt_cosmics2017/v296	l1_trg_cosmics2017/v183	/cdaq/cosmic/commissioning2017/CRAFT/v3.0/HLT/V2	2017.11.03 10:10:08	2017.11.03 10:18:14	1150644	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306111	0.000000 0.000000	GLOBAL-RUN tagpro	l1_hlt_cosmics2017/v295	l1_trg_cosmics2017/v182	/cdaq/cosmic/commissioning2017/CRAFT/v3.0/HLT/V2	2017.11.03 09:46:44	2017.11.03 10:03:08	2165112	3.801	1	CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306103	0.000000 0.000000	GLOBAL-RUN tagpro	l1_hlt_cosmics2017/v295	l1_trg_cosmics2017/v182	/cdaq/cosmic/commissioning2017/CRAFT/v3.0/HLT/V2	2017.11.03 09:20:22	2017.11.03 09:46:13	60742881	3.801	1	CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306100	0.000000 0.000000	GLOBAL-RUN tagpro	l1_hlt_cosmics2017/v295	l1_trg_cosmics2017/v182	/cdaq/cosmic/commissioning2017/CRAFT/v3.0/HLT/V2	2017.11.03 09:17:01	2017.11.03 09:18:12	17461	3.801	1	CTPPS CTPPS_TOT DAQ DCS DQM DT ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG

WBM Stream Summary

Run Summary

All times are in UTC.
TRIGGERS and L1 triggers numbers are the total pre-deadtime triggers, including Calibration and Random ones.

RUN	LUMI_NB_LIVE_DELIV	SEQUENCE	TRIGGER_MODE	L1_KEY	HLT_KEY	STARTTIME	STOPTIME	TRIGGERS	BFIELD	TIER0	COMPONENTS
298949	0.000000 0.000000	GLOBAL-RUN toppro	l1_hlt_cosmics2017/v214	l1_trg_cosmics2017/v128	/cdaq/cosmic /commissioning2017 /CRAFT /v2.3/HLT/V2	2017.07.13 11:22:09	2017.07.13 11:30:42	404668	3.799	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF RPC SCAL TCDS TRG

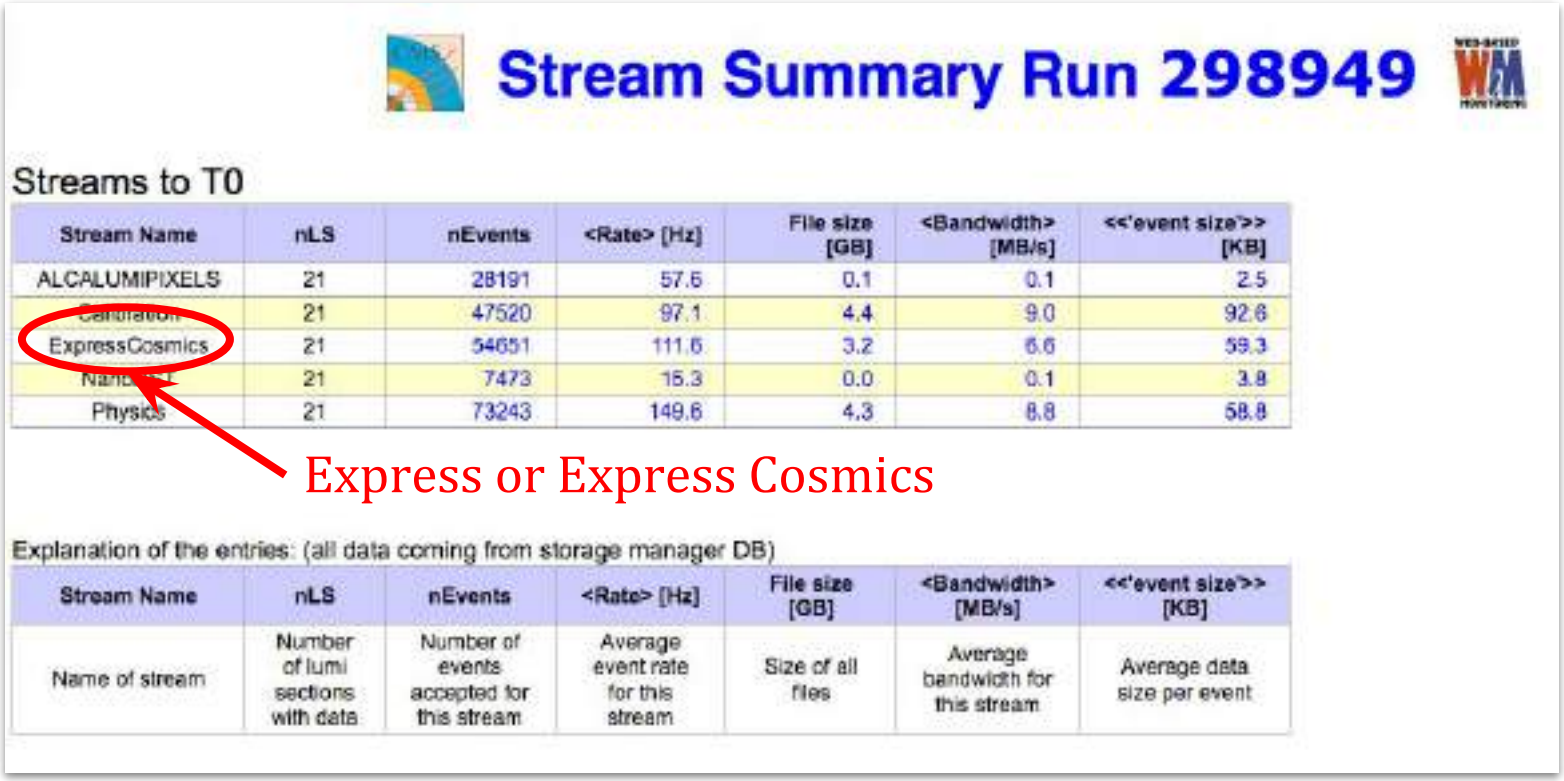
<298947| > **Sub-system specific WBM services:** CSC | DT | ECAL | HCAL | PIXEL | RPC | TRACKER

Other services: Clock | DBS | DCS | DQM GUI Online | DQM GUI Offline | eLog | FMM DeadTime | Lhc Events | Lumi Sections | Prescale Changes | Prescale Sets | Prescale Change Paths | Run Info | Dataset Summary | Stream Summary

HLT Streams

BField	3.799 Tesla
InitialPrescaleIndex	0
Tier0Transfer	true
TriggerMode	l1_hlt_cosmics2017/v214
TTC MI/TCDS Key	n/a
L1 Key	l1_trg_cosmics2017/v128
HLT Key	/cdaq/cosmic/commissioning2017/CRAFT/v2.3/HLT/V2
Online Version	CMSSW_9_2_3_patch2
L1 Rate	826.660 Hz
L1 Triggers	404668
HLT Rate Physics Streams	157.104 Hz
HLT Triggers Physics Streams	73243
HLT Size Physics Streams	4.303 Gigabytes
HLT Rate Physics Streams	0.009 Gigabytes/sec

WBM Stream Summary



Stream Summary Run 298949

Streams to T0

Stream Name	nLS	nEvents	<Rate> [Hz]	File size [GB]	<Bandwidth> [MB/s]	<<'event size'>> [KB]
ALCALUMIPIXELS	21	28191	57.6	0.1	0.1	2.5
Calibration	21	47520	97.1	4.4	9.0	92.6
ExpressCosmics	21	54651	111.6	3.2	6.6	59.3
Name [illegible]	21	7473	15.3	0.0	0.1	3.8
Physics	21	73243	149.6	4.3	8.8	58.8

Express or Express Cosmics

Explanation of the entries: (all data coming from storage manager DB)

Stream Name	nLS	nEvents	<Rate> [Hz]	File size [GB]	<Bandwidth> [MB/s]	<<'event size'>> [KB]
Name of stream	Number of lumi sections with data	Number of events accepted for this stream	Average event rate for this stream	Size of all files	Average bandwidth for this stream	Average data size per event

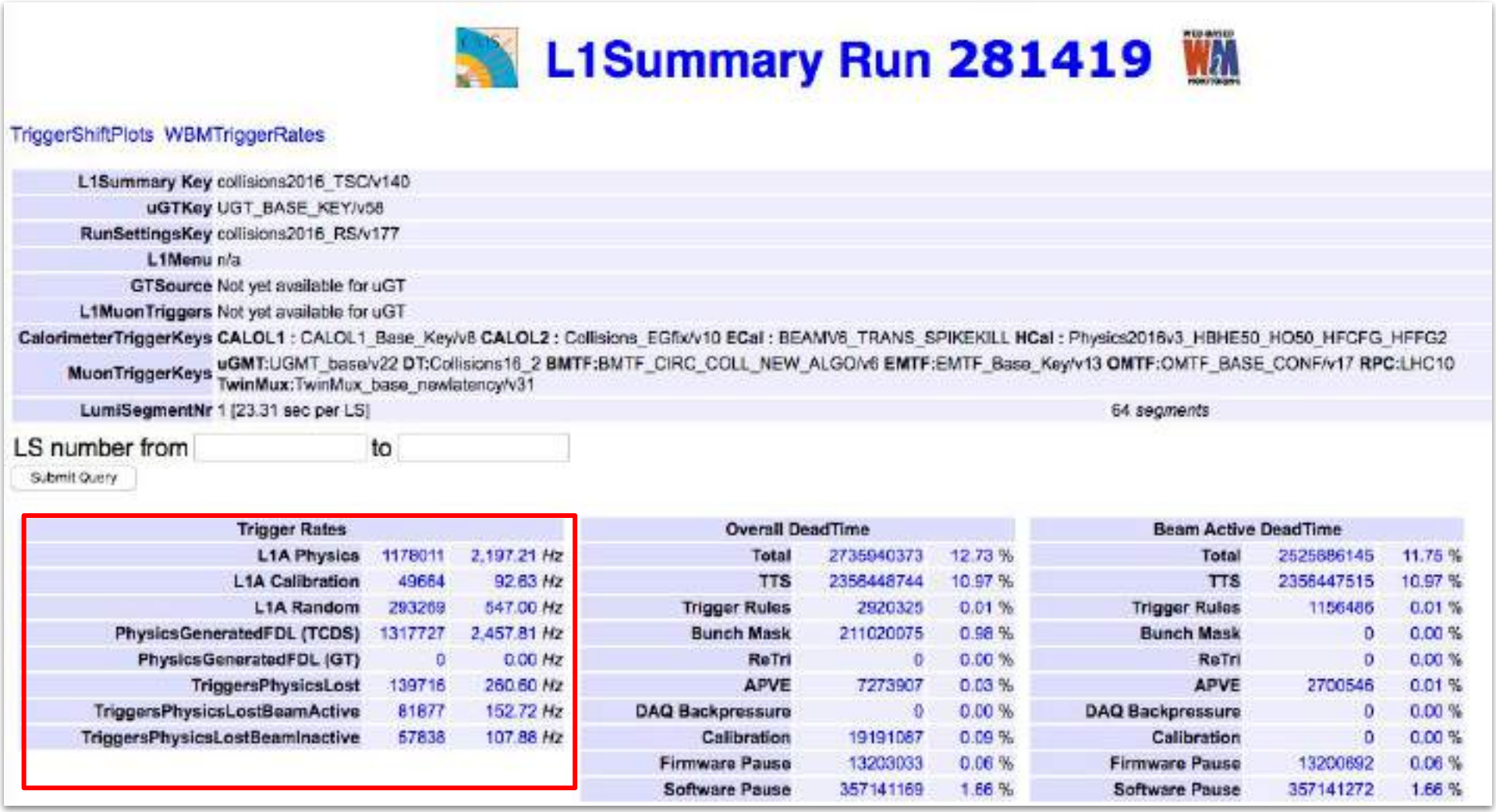
L1Summary

Run Summary

All times are in UTC.
TRIGGERS and L1 triggers numbers are the total pre-deadtime triggers, including Calibration and Random ones.

RUN	LUMI_NR_LIVE_DELIV	SEQUENCE	TRIGGER_MODE	L1_KEY	HLT_KEY	STARTTIME	STOPTIME	TRIGGERS	BFIELD	TIER0	COMPONENTS
306125	667,328.726583 688,811.921879	GLOBAL-RUN trigpro	l1_hlt_collisions2017v315	l1_trg_collisions2017v135	/cdaq/physics/Run2017/2e34/v4.1.8/HLT/V3	2017.11.03 14:45:28	2017.11.04 10:12:01	4874674639	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306122	40,489.853519 46,844.625800	GLOBAL-RUN trigpro	l1_hlt_collisions2017v315	l1_trg_collisions2017v135	/cdaq/physics/Run2017/2e34/v4.1.8/HLT/V3	2017.11.03 10:52:33	2017.11.03 14:42:19	222453866	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306121	29,198.343750 34,209.804688	GLOBAL-RUN trigpro	l1_hlt_collisions2017v315	l1_trg_collisions2017v135	/cdaq/physics/Run2017/2e34/v4.1.8/HLT/V3	2017.11.03 12:53:27	2017.11.03 13:51:15	169540704	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306120	0.000000 0.000000	GLOBAL-RUN trigpro	l1_hlt_circulating2017v133	l1_trg_circulating2017v69	/cdaq/special/Circulating2017/v3.2.0/HLT/V1	2017.11.03 11:07:56	2017.11.03 12:51:05	13675857	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306119	0.000000 0.000000	GLOBAL-RUN trigpro	l1_hlt_collisions2017v315	l1_trg_collisions2017v135	/cdaq/physics/Run2017/2e34/v4.1.8/HLT/V3	2017.11.03 11:00:41	2017.11.03 11:06:05	203234	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306118	0.000000 0.000000	GLOBAL-RUN trigpro	l1_hlt_circulating2017v133	l1_trg_circulating2017v69	/cdaq/special/Circulating2017/v3.2.0/HLT/V1	2017.11.03 10:55:10	2017.11.03 10:58:25	267200	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306116	0.000000 0.000000	GLOBAL-RUN trigpro	l1_hlt_collisions2017v314	l1_trg_collisions2017v134	/cdaq/physics/Run2017/2e34/v4.1.8/HLT/V3	2017.11.03 10:36:24	2017.11.03 10:44:07	214243	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306115	0.000000 0.000000	GLOBAL-RUN trigpro	l1_hlt_collisions2017v314	l1_trg_collisions2017v134	/cdaq/physics/Run2017/2e34/v4.1.8/HLT/V3	2017.11.03 10:30:03	2017.11.03 10:36:02	199180	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306114	0.000000 0.000000	GLOBAL-RUN trigpro	l1_hlt_circulating2017v132	l1_trg_circulating2017v68	/cdaq/special/Circulating2017/v3.2.0/HLT/V1	2017.11.03 10:22:59	2017.11.03 10:29:11	662247	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306113	0.000000 0.000000	GLOBAL-RUN trigpro	l1_hlt_cosmics2017v298	l1_trg_cosmics2017v183	/cdaq/cosmicscommissioning2017/ORAPTIv3.0/HLT/V2	2017.11.03 10:10:08	2017.11.03 10:19:14	1156844	3.801	1	CSC CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306111	0.000000 0.000000	GLOBAL-RUN trigpro	l1_hlt_cosmics2017v298	l1_trg_cosmics2017v182	/cdaq/cosmicscommissioning2017/ORAPTIv3.0/HLT/V2	2017.11.03 09:46:44	2017.11.03 10:03:09	2165112	3.801	1	CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306109	0.000000 0.000000	GLOBAL-RUN trigpro	l1_hlt_cosmics2017v298	l1_trg_cosmics2017v182	/cdaq/cosmicscommissioning2017/ORAPTIv3.0/HLT/V2	2017.11.03 09:20:22	2017.11.03 09:46:13	60742851	3.801	1	CTPPS CTPPS_TOT DAQ DCS DQM DT ECAL ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG
306108	0.000000 0.000000	GLOBAL-RUN trigpro	l1_hlt_cosmics2017v298	l1_trg_cosmics2017v182	/cdaq/cosmicscommissioning2017/ORAPTIv3.0/HLT/V2	2017.11.03 09:17:01	2017.11.03 09:18:12	17461	3.801	1	CTPPS CTPPS_TOT DAQ DCS DQM DT ES HCAL HF PIXEL RPC SCAL TCDS TRACKER TRG

Values on L1Summary



L1Summary Run 281419

TriggerShiftPlots WBMTriggerRates

L1Summary Key	collisions2016_TSC/v140
uGTKey	UGT_BASE_KEY/v58
RunSettingsKey	collisions2016_RS/v177
L1Menu	n/a
GTSource	Not yet available for uGT
L1MuonTriggers	Not yet available for uGT
CalorimeterTriggerKeys	**CALOL1** : CALOL1_Base_Key/v8 **CALOL2** : Collisions_EGfix/v10 **ECal** : BEAMV6_TRANS_SPIKEKILL **HCal** : Physics2016v3_HBHE50_HO50_HFCFG_HFFG2
MuonTriggerKeys	**uGMT**:UGMT_base/v22 **DT**:Collisions16_2 **BMTF**:BMTF_CIRC_COLL_NEW_ALGO/v6 **EMTF**:EMTF_Base_Key/v13 **OMTF**:OMTF_BASE_CONF/v17 **RPC**:LHC10 **TwinMux**:TwinMux_base_newlatency/v31
LumiSegmentNr	1 [23.31 sec per LS] — *64 segments*

LS number from to

Submit Query

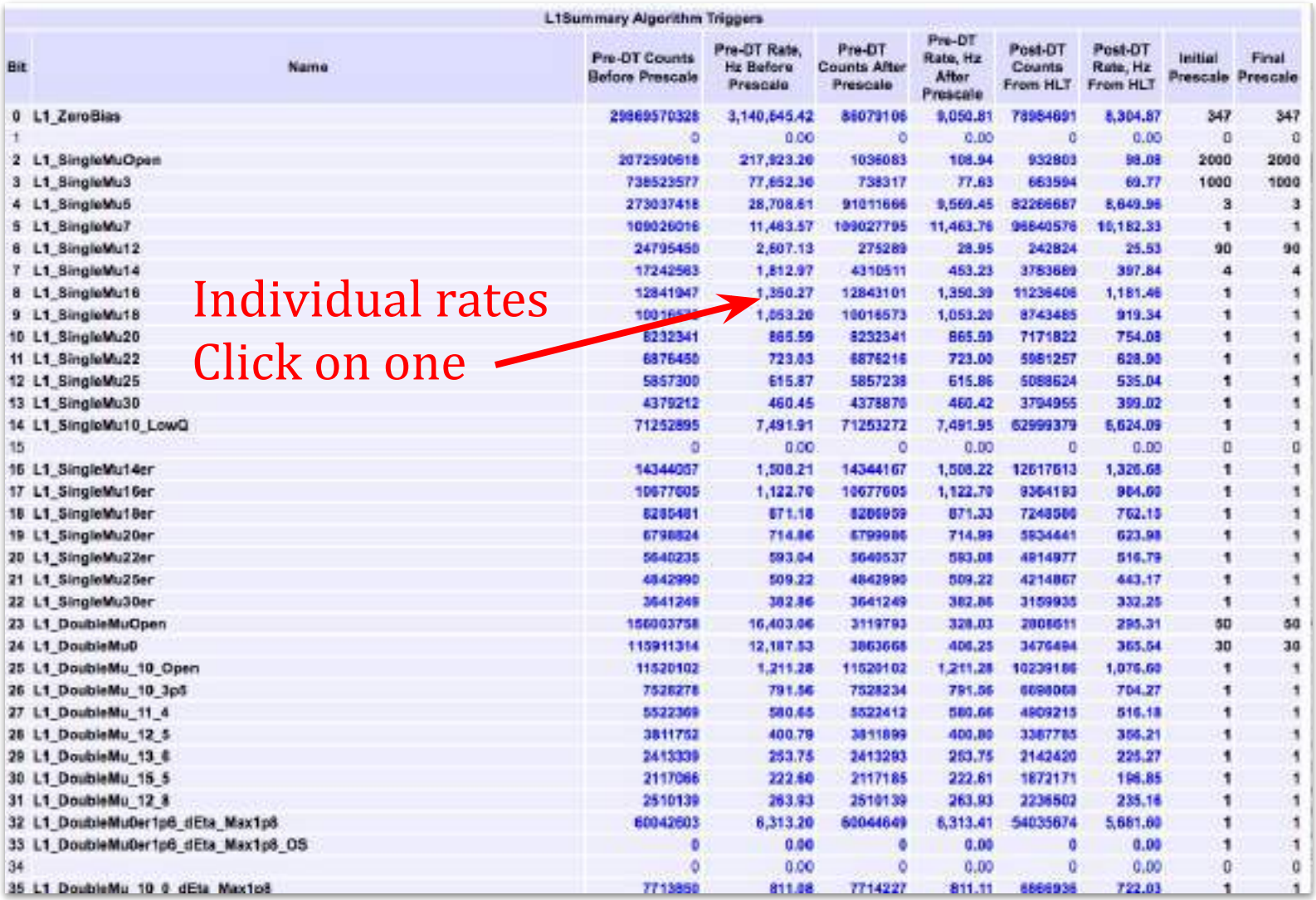
Trigger Rates		
L1A Physics	1178011	2,197.21 Hz
L1A Calibration	49664	92.63 Hz
L1A Random	293269	547.00 Hz
PhysicsGeneratedFDL (TCDS)	1317727	2,457.81 Hz
PhysicsGeneratedFDL (GT)	0	0.00 Hz
TriggersPhysicsLost	139716	260.60 Hz
TriggersPhysicsLostBeamActive	81877	152.72 Hz
TriggersPhysicsLostBeamInactive	57838	107.88 Hz

Overall DeadTime		
Total	2735940373	12.73 %
TTS	2358448744	10.97 %
Trigger Rules	2920325	0.01 %
Bunch Mask	211020075	0.98 %
ReTri	0	0.00 %
APVE	7273907	0.03 %
DAQ Backpressure	0	0.00 %
Calibration	19191087	0.09 %
Firmware Pause	13203033	0.06 %
Software Pause	357141169	1.66 %

Beam Active DeadTime		
Total	2525686145	11.75 %
TTS	2358447515	10.97 %
Trigger Rules	1156486	0.01 %
Bunch Mask	0	0.00 %
ReTri	0	0.00 %
APVE	2700546	0.01 %
DAQ Backpressure	0	0.00 %
Calibration	0	0.00 %
Firmware Pause	13200692	0.06 %
Software Pause	357141272	1.66 %

Scroll down for individual trigger rates.

Rate History via WBM



L1Summary Algorithm Triggers

Bit	Name	Pre-DT Counts Before Prescale	Pre-DT Rate, Hz Before Prescale	Pre-DT Counts After Prescale	Pre-DT Rate, Hz After Prescale	Post-DT Counts From HLT	Post-DT Rate, Hz From HLT	Initial Prescale	Final Prescale
0	L1_ZeroBias	29869570328	3,140,645.42	86079106	9,050.81	78954891	8,304.87	347	347
1		0	0.00	0	0.00	0	0.00	0	0
2	L1_SingleMuOpen	2072590618	217,923.26	1036083	108.94	932803	98.08	2000	2000
3	L1_SingleMu3	738523577	77,652.36	738317	77.63	663594	69.77	1000	1000
4	L1_SingleMu5	273037418	28,708.61	91011666	9,569.45	82266667	8,649.96	3	3
5	L1_SingleMu7	109026016	11,463.57	109027795	11,463.76	96840576	10,182.33	1	1
6	L1_SingleMu12	24795450	2,607.13	275289	28.95	242824	25.53	90	90
7	L1_SingleMu14	17242583	1,812.97	4310511	453.23	3753689	397.84	4	4
8	L1_SingleMu16	12841947	1,350.27	12843101	1,350.39	11236408	1,181.46	1	1
9	L1_SingleMu18	10016573	1,053.20	10016573	1,053.20	8743485	919.34	1	1
10	L1_SingleMu20	8232341	865.59	8232341	865.59	7171822	754.08	1	1
11	L1_SingleMu22	6876450	723.03	6876216	723.00	5981257	628.90	1	1
12	L1_SingleMu25	5857300	615.87	5857238	615.86	5088624	535.04	1	1
13	L1_SingleMu30	4379212	460.45	4378870	460.42	3794955	399.02	1	1
14	L1_SingleMu10_LowQ	71252895	7,491.91	71253272	7,491.95	62999379	6,624.09	1	1
15		0	0.00	0	0.00	0	0.00	0	0
16	L1_SingleMu14er	14344057	1,508.21	14344167	1,508.22	12617613	1,326.68	1	1
17	L1_SingleMu16er	10677605	1,122.79	10677605	1,122.79	9364193	984.60	1	1
18	L1_SingleMu18er	8285481	871.18	8285959	871.33	7248586	762.15	1	1
19	L1_SingleMu20er	6798824	714.86	6799986	714.99	5934441	623.98	1	1
20	L1_SingleMu22er	5640235	593.04	5640537	593.08	4814977	516.79	1	1
21	L1_SingleMu25er	4842990	509.22	4842990	509.22	4214867	443.17	1	1
22	L1_SingleMu30er	3641249	382.86	3641249	382.86	3159935	332.25	1	1
23	L1_DoubleMuOpen	156003758	16,403.06	3119793	328.03	2806611	295.31	50	50
24	L1_DoubleMu0	115911314	12,187.53	3863668	406.25	3476494	365.54	30	30
25	L1_DoubleMu_10_Open	11520102	1,211.28	11520102	1,211.28	10239186	1,076.60	1	1
26	L1_DoubleMu_10_3p5	7528278	791.56	7528234	791.55	6698068	704.27	1	1
27	L1_DoubleMu_11_4	5522369	580.65	5522412	580.66	4909215	516.18	1	1
28	L1_DoubleMu_12_5	3811752	400.79	3811899	400.80	3387785	356.21	1	1
29	L1_DoubleMu_13_6	2413339	253.75	2413293	253.75	2142420	225.27	1	1
30	L1_DoubleMu_15_5	2117086	222.60	2117185	222.61	1872171	196.85	1	1
31	L1_DoubleMu_12_8	2510139	263.93	2510139	263.93	2236502	235.16	1	1
32	L1_DoubleMu0er1p6_dEta_Max1p8	60042603	6,313.20	60044649	6,313.41	54035674	5,681.60	1	1
33	L1_DoubleMu0er1p6_dEta_Max1p8_OS	0	0.00	0	0.00	0	0.00	1	1
34		0	0.00	0	0.00	0	0.00	0	0
35	L1_DoubleMu_10_0_dEta_Max1p8	7713859	811.08	7714227	811.11	6866936	722.03	1	1

Rate History via WBM

L1 Summary

L1 Algorithm trigger rates for L1_SingleEG5: run 272936, bit 39

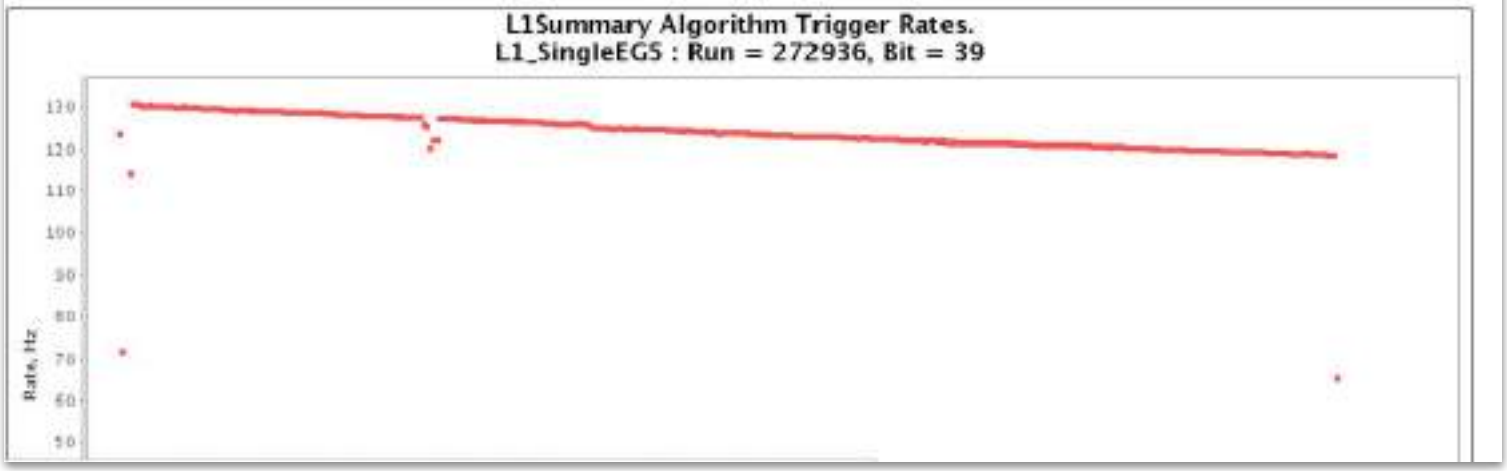
LS time from to
LS number from to
Rate, Hz: Min. Max.
Counts: Min. Max.
Pre Dead-time rates Post Dead-time rates

Logarithmic scale Lines Draw: Rates per Timestamp Debug

Submit Query

Run	Bit	Name	LS length, sec.	First Timestamp	Last Timestamp	First LS	Last LS	Min. Count	Max. Count	Min. Rate, Hz	Max. Rate, Hz
272936	39	L1_SingleEG5	23.3104	2016.05.10 04:07:29	2016.05.10 06:45:37	2	409	0	3043	0.0000	130.5425

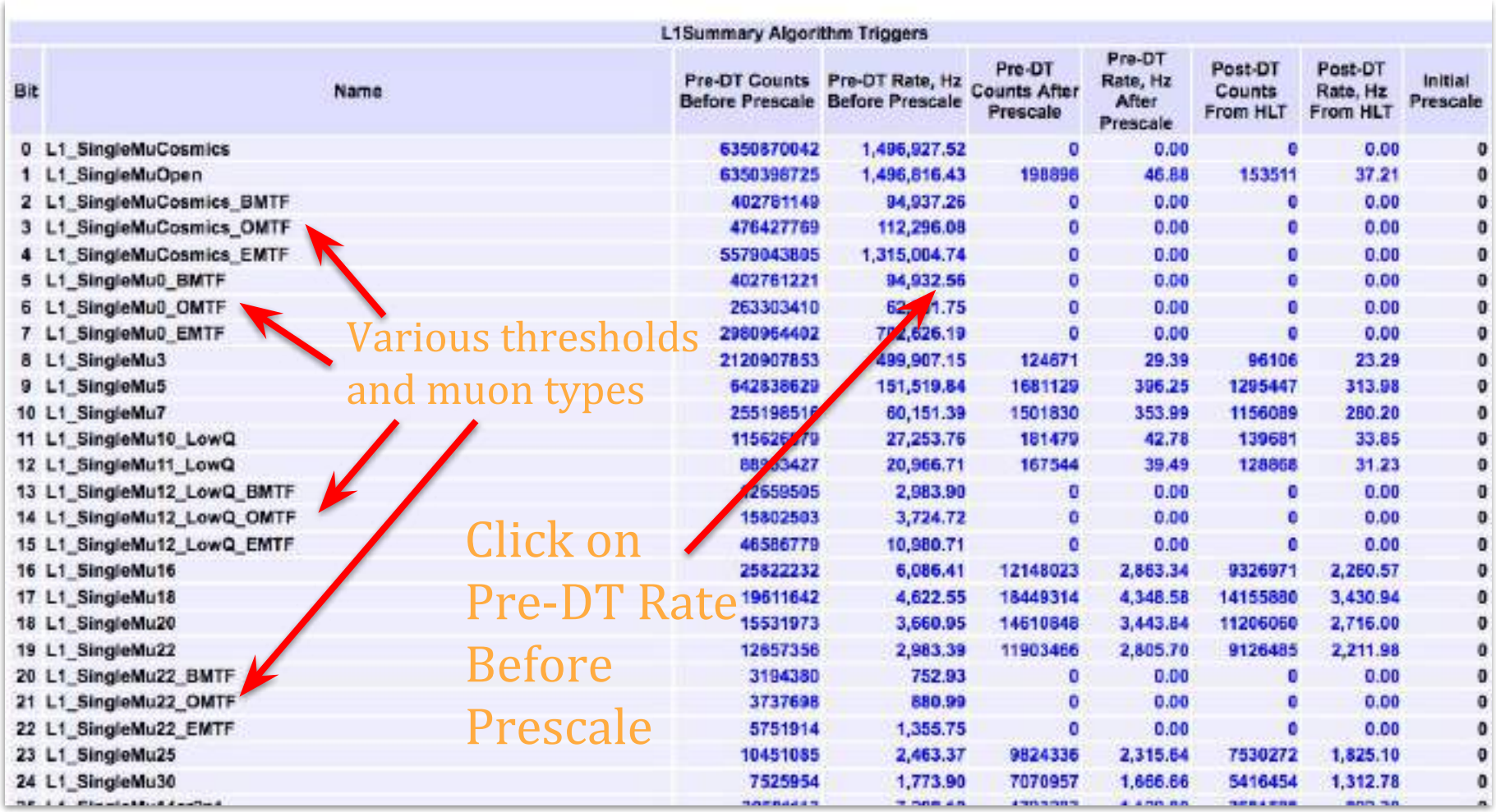
Type	Entries	Avg. Count	RMS Count	Min. Count	Max. Count	Avg. Rate, Hz	RMS Rate, Hz	Min. Rate, Hz	Max. Rate, Hz
Pre DT	408	2661.9142	2771.4380	0	3043	114.1942	118.8927	0.0000	130.5425



Rate (or counts) plots
vs. time or lumi-section

Individual Muon Track Finder Rates

Rates per muon track finder (MTF) are now available via the WBM L1T Summary Page

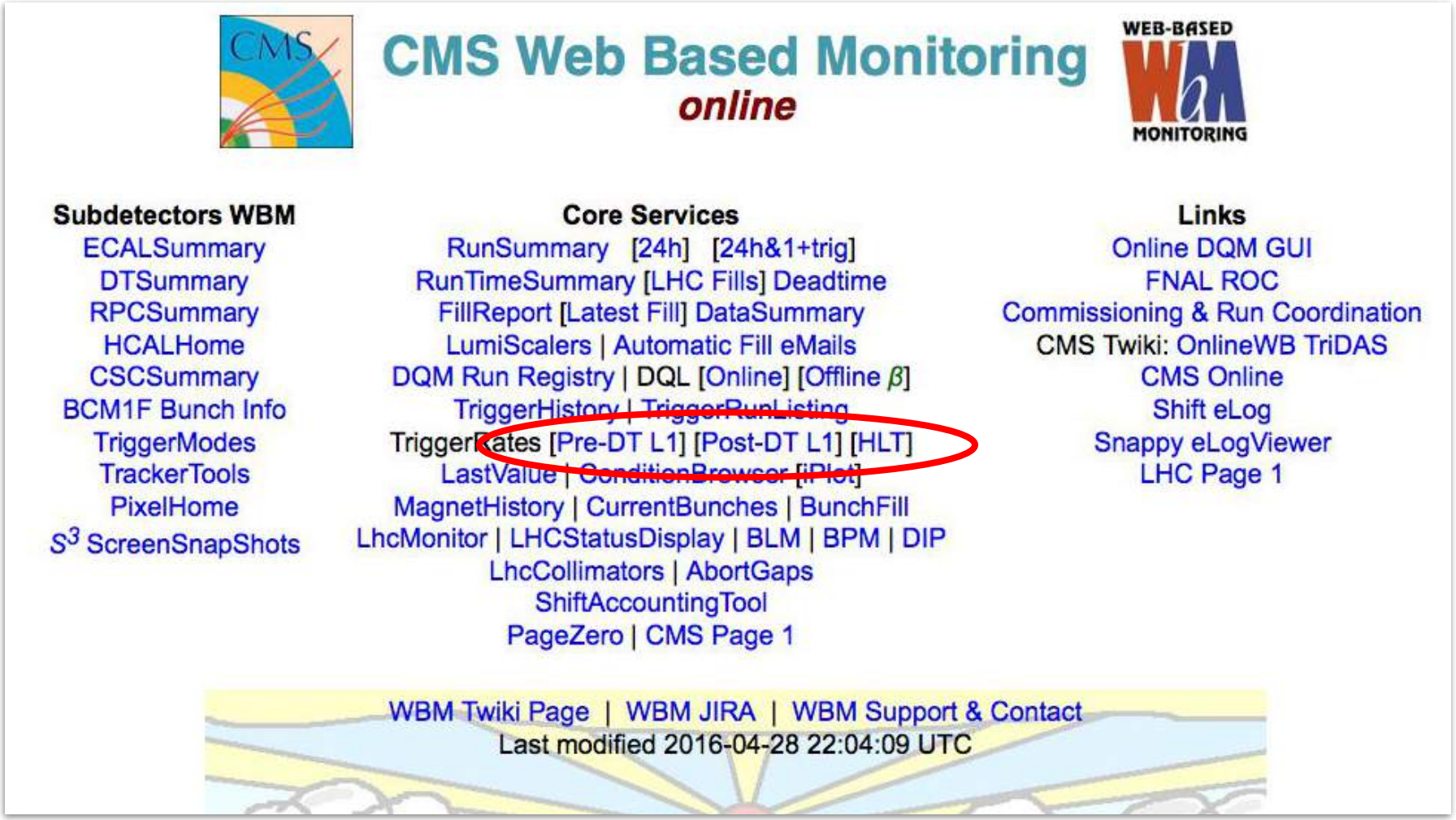


L1Summary Algorithm Triggers

Bit	Name	Pre-DT Counts Before Prescale	Pre-DT Rate, Hz Before Prescale	Pre-DT Counts After Prescale	Pre-DT Rate, Hz After Prescale	Post-DT Counts From HLT	Post-DT Rate, Hz From HLT	Initial Prescale
0	L1_SingleMuCosmics	6350870042	1,496,927.52	0	0.00	0	0.00	0
1	L1_SingleMuOpen	6350398725	1,496,816.43	198898	46.88	153511	37.21	0
2	L1_SingleMuCosmics_BMTF	402761149	94,937.26	0	0.00	0	0.00	0
3	L1_SingleMuCosmics_OMTF	476427769	112,296.08	0	0.00	0	0.00	0
4	L1_SingleMuCosmics_EMTF	5579043805	1,315,004.74	0	0.00	0	0.00	0
5	L1_SingleMu0_BMTF	402761221	94,932.56	0	0.00	0	0.00	0
6	L1_SingleMu0_OMTF	263303410	62[illegible]1.75	0	0.00	0	0.00	0
7	L1_SingleMu0_EMTF	2980964402	7[illegible],626.19	0	0.00	0	0.00	0
8	L1_SingleMu3	2120907853	499,907.15	124671	29.39	96106	23.29	0
9	L1_SingleMu5	642838629	151,519.84	1681129	396.25	1295447	313.98	0
10	L1_SingleMu7	255198516	60,151.39	1501830	353.99	1156089	280.20	0
11	L1_SingleMu10_LowQ	115626[illegible]79	27,253.76	181479	42.78	139681	33.85	0
12	L1_SingleMu11_LowQ	88[illegible]3427	20,966.71	167544	39.49	128868	31.23	0
13	L1_SingleMu12_LowQ_BMTF	[illegible]2659595	2,983.90	0	0.00	0	0.00	0
14	L1_SingleMu12_LowQ_OMTF	15802503	3,724.72	0	0.00	0	0.00	0
15	L1_SingleMu12_LowQ_EMTF	46586779	10,980.71	0	0.00	0	0.00	0
16	L1_SingleMu16	25822232	6,086.41	12148023	2,863.34	9326971	2,260.57	0
17	L1_SingleMu18	19611642	4,622.55	18449314	4,348.58	14155880	3,430.94	0
18	L1_SingleMu20	15531973	3,660.95	14610848	3,443.84	11206060	2,716.00	0
19	L1_SingleMu22	12657356	2,983.39	11903466	2,805.70	9126485	2,211.98	0
20	L1_SingleMu22_BMTF	3194380	752.93	0	0.00	0	0.00	0
21	L1_SingleMu22_OMTF	3737698	880.99	0	0.00	0	0.00	0
22	L1_SingleMu22_EMTF	5751914	1,355.75	0	0.00	0	0.00	0
23	L1_SingleMu25	10451085	2,463.37	9824336	2,315.64	7530272	1,825.10	0
24	L1_SingleMu30	7525954	1,773.90	7070957	1,666.66	5416454	1,312.78	0

WBM for Detailed Trigger Rate Plots

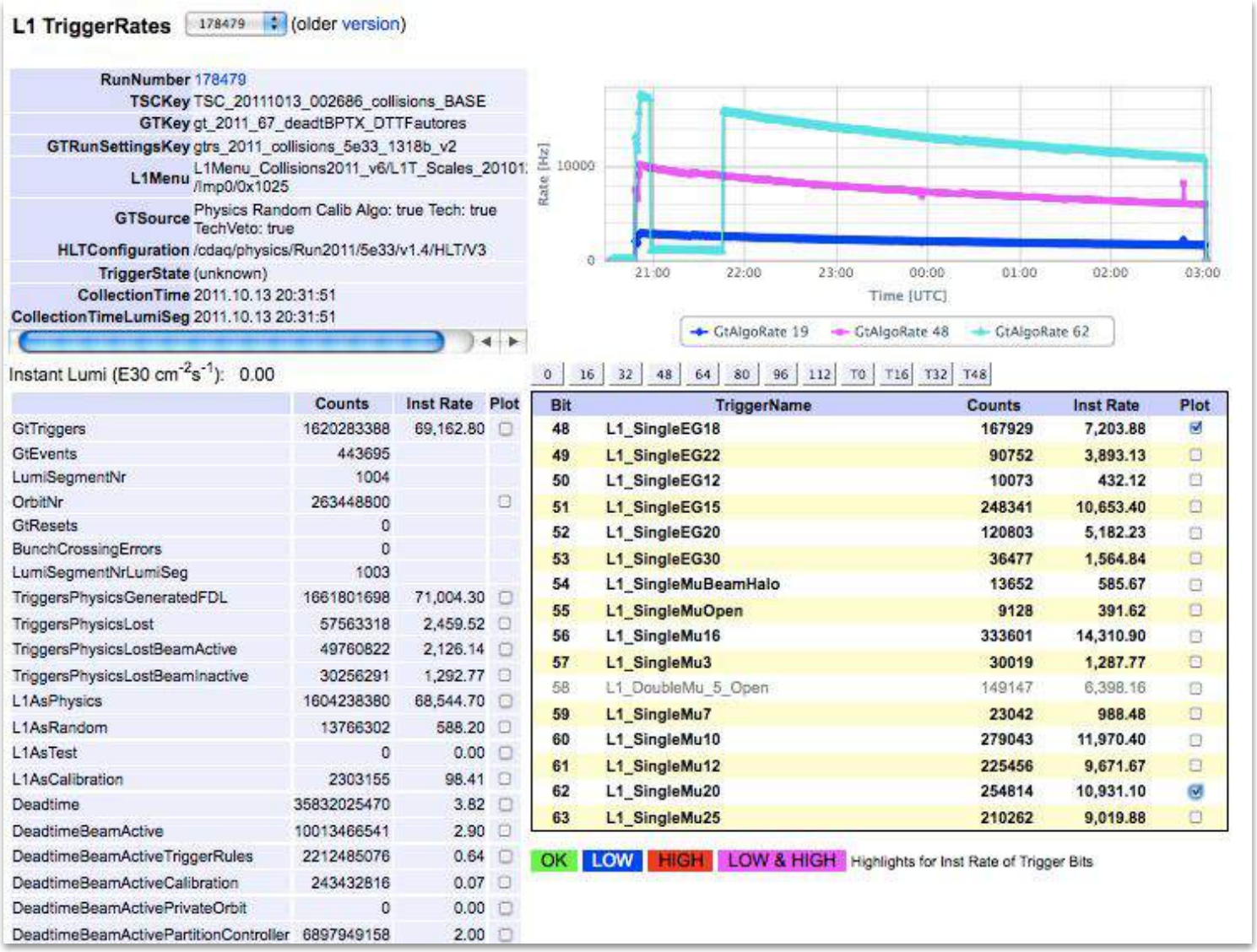
For live monitoring..



WBM: Pre-Deadtime Rates

Note: This is total trigger rate – uGT + Random (600 Hz) +Calibration (100 Hz)

WBM Trigger Rate Example



	Counts	Inst Rate	Plot
GtTriggers	1620283388	69,162.80	
GtEvents	443695		
LumiSegmentNr	1004		
OrbitNr	263448800		
GtResets	0		
BunchCrossingErrors	0		
LumiSegmentNrLumiSeg	1003		
TriggersPhysicsGeneratedFDL	1661801698	71,004.30	
TriggersPhysicsLost	57563318	2,459.52	
TriggersPhysicsLostBeamActive	49760822	2,126.14	
TriggersPhysicsLostBeamInactive	30256291	1,292.77	
L1AsPhysics	1604238380	68,544.70	
L1AsRandom	13766302	588.20	
L1AsTest	0	0.00	
L1AsCalibration	2303155	98.41	
Deadtime	35832025470	3.82	
DeadtimeBeamActive	10013466541	2.90	
DeadtimeBeamActiveTriggerRules	2212485076	0.64	
DeadtimeBeamActiveCalibration	243432816	0.07	
DeadtimeBeamActivePrivateOrbit	0	0.00	
DeadtimeBeamActivePartitionController	6897949158	2.00	

Bit	TriggerName	Counts	Inst Rate	Plot
48	L1_SingleEG18	167929	7,203.88	
49	L1_SingleEG22	90752	3,893.13	
50	L1_SingleEG12	10073	432.12	
51	L1_SingleEG15	248341	10,653.40	
52	L1_SingleEG20	120803	5,182.23	
53	L1_SingleEG30	36477	1,564.84	
54	L1_SingleMuBeamHalo	13652	585.67	
55	L1_SingleMuOpen	9128	391.62	
56	L1_SingleMu16	333601	14,310.90	
57	L1_SingleMu3	30019	1,287.77	
58	L1_DoubleMu_5_Open	149147	6,398.16	
59	L1_SingleMu7	23042	988.48	
60	L1_SingleMu10	279043	11,970.40	
61	L1_SingleMu12	225456	9,671.67	
62	L1_SingleMu20	254814	10,931.10	
63	L1_SingleMu25	210262	9,019.88	

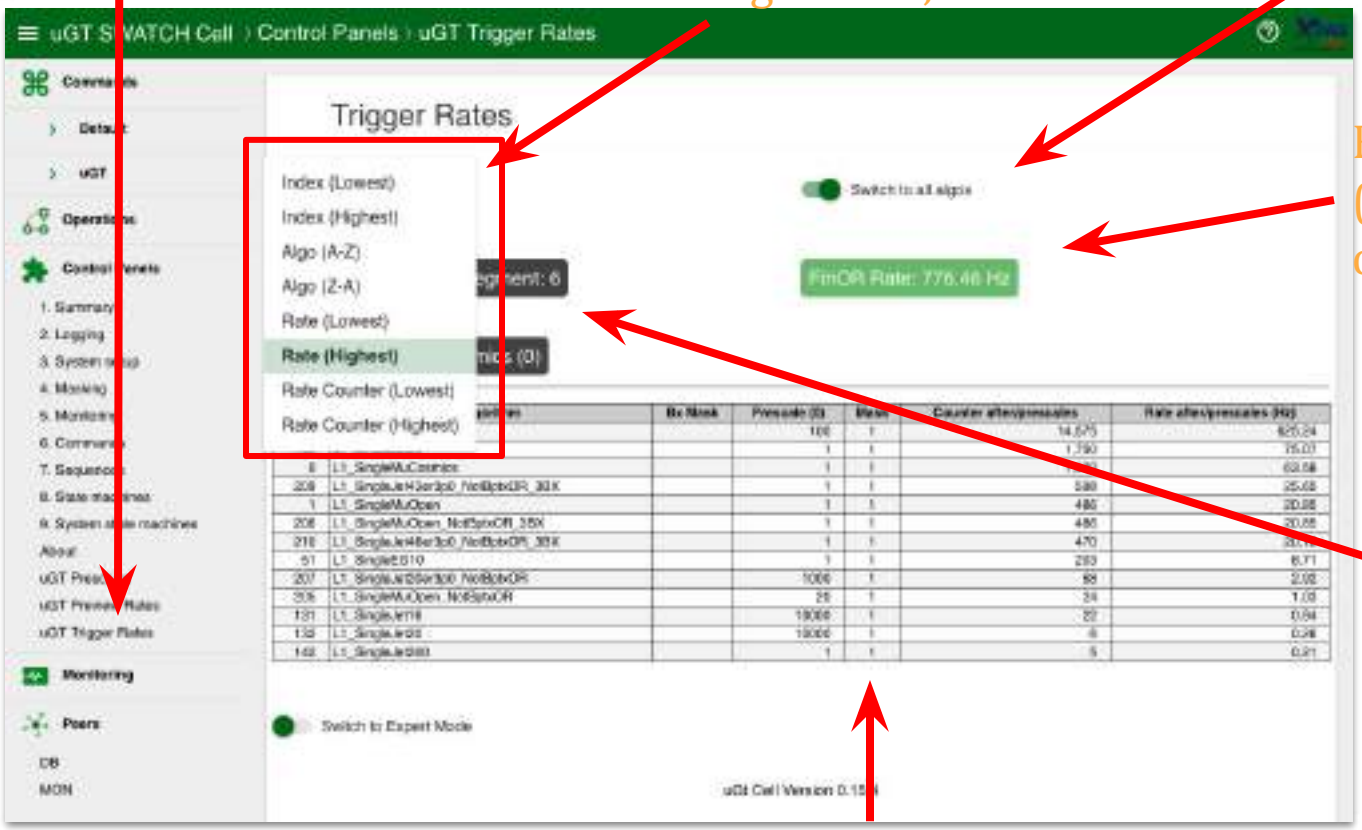
It is a good idea to monitor at least a jet, e/gamma (isoEG and EG), a HTT, and muon trigger – sometimes unusual behavior isn't obvious in the main plot, and this catches problems w/links.

Checking Individual Rates at the uGT

Go to the uGT on the L1 Page
And click on uGT Counter Rates

Sort by rate,
Algo name, etc

View unused
algos

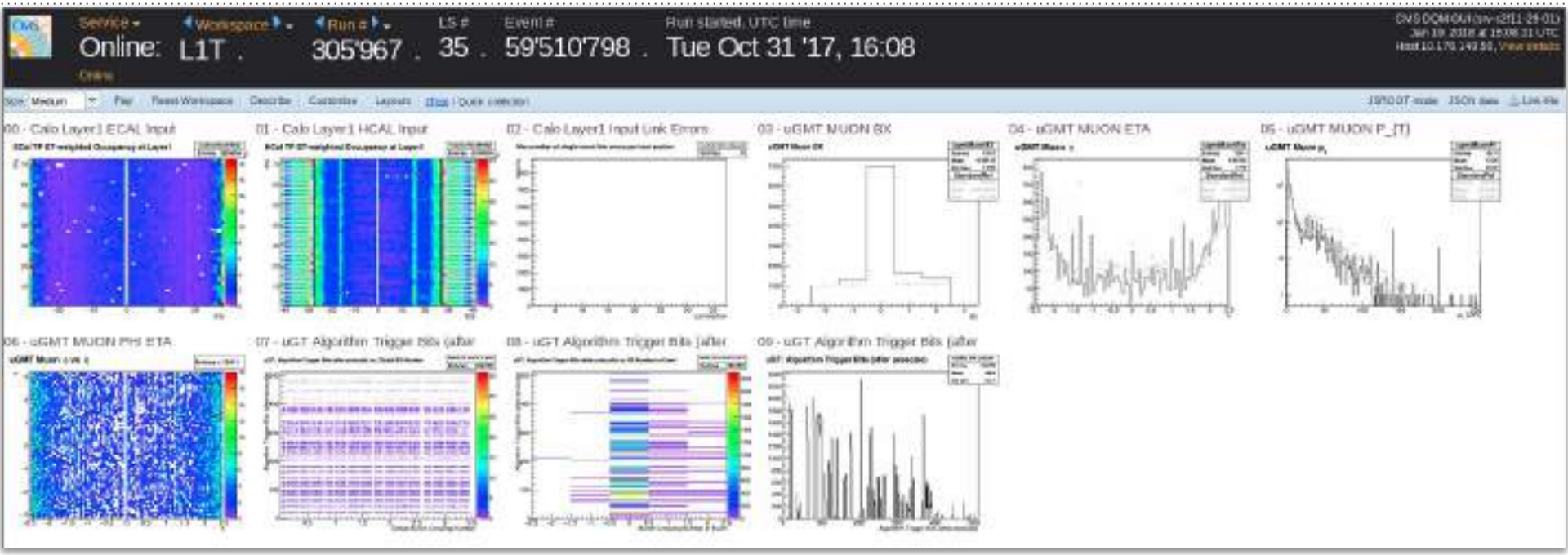


FinOR Rate
(pre-deadtime)
out of uGT

Current
Lumisection
and Prescale
Column

Algo Index, Name, and rate in Hz. When in collisions,
scroll down to see more.

DQM – L1T Quick Collection



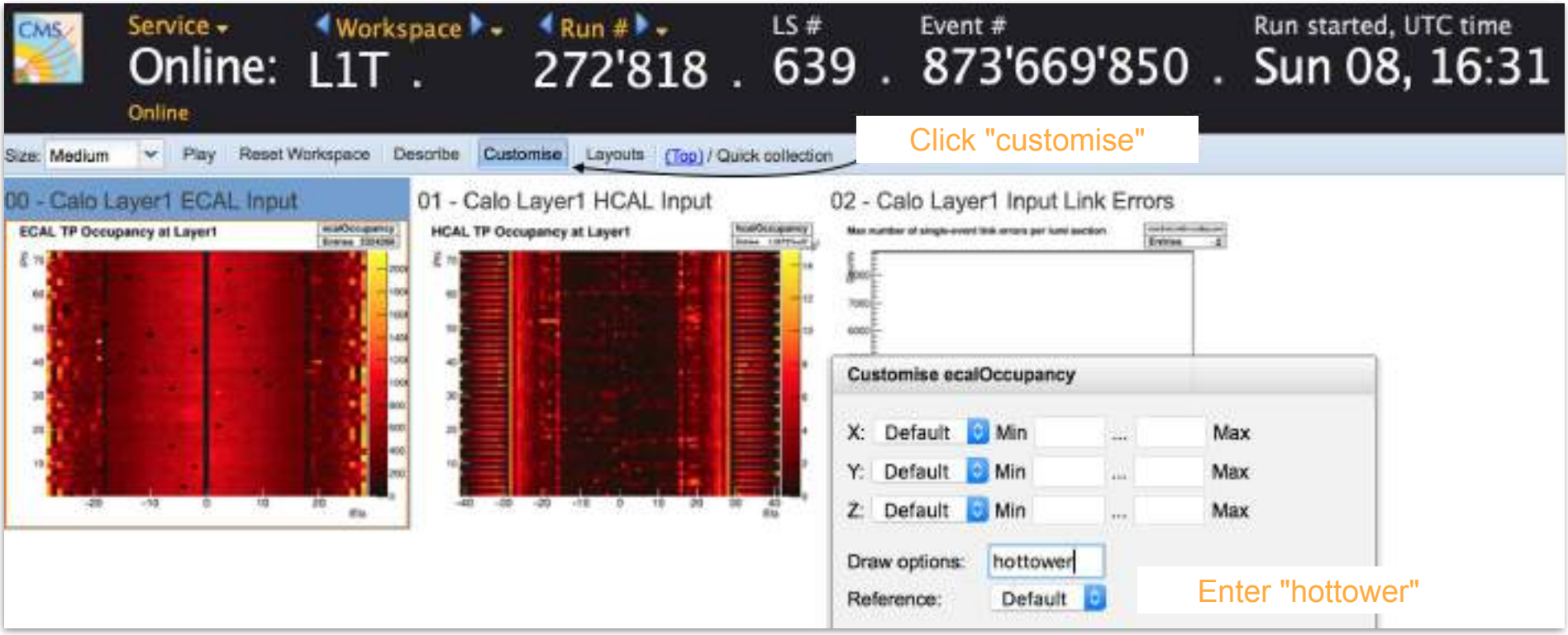
Check these plots regularly (collisions run above):

- Occupancies should have no big holes or hot towers
  - Calorimeter (plot 00 & 01)
  - Muons (plot 04 & 06)
- Timing plots (03 & 08) should be centered at zero
  - **Immediately call L1 DOC if not!**
- Input link errors (plot 02) should be very near zero (during collisions) to zero (during cosmics)
  - You may have to decrease the y-axis range to to 100 (button “Customise”)

DQM – L1T Quick Collection

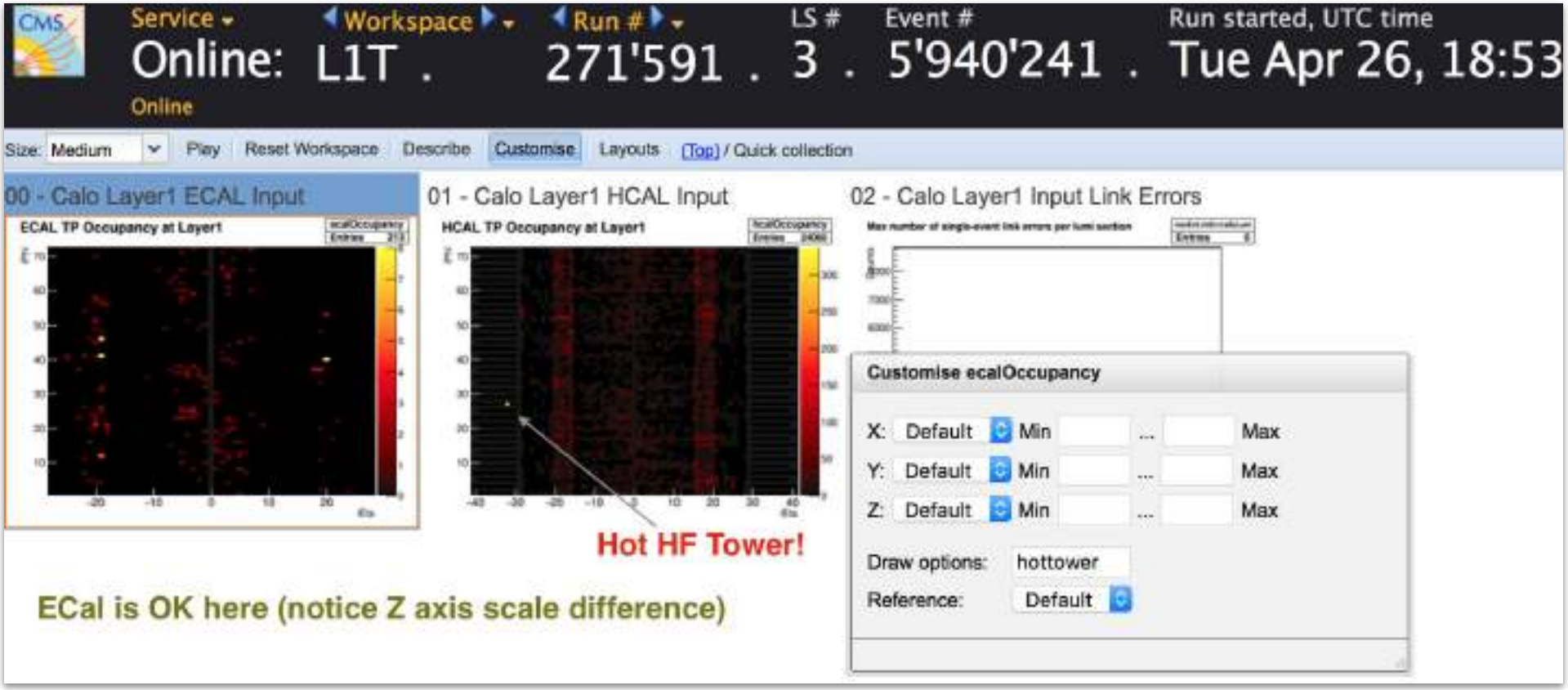
Click on "Customise" to get the panel for editing the plots

- Under Draw Options type “hottower” to get a different color scale option



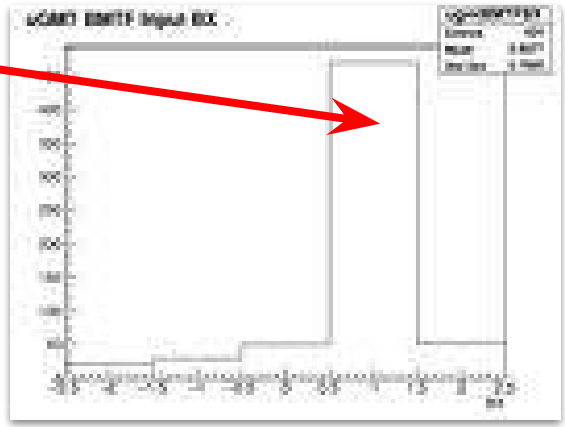
DQM – L1T Quick Collection

Hot towers will “pop”, but check the Z scale before calling someone



L1T DQM Issues

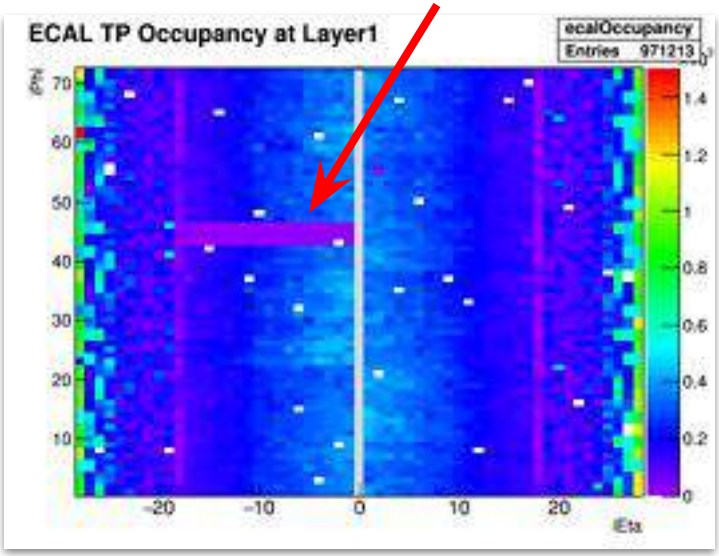
Timing shift



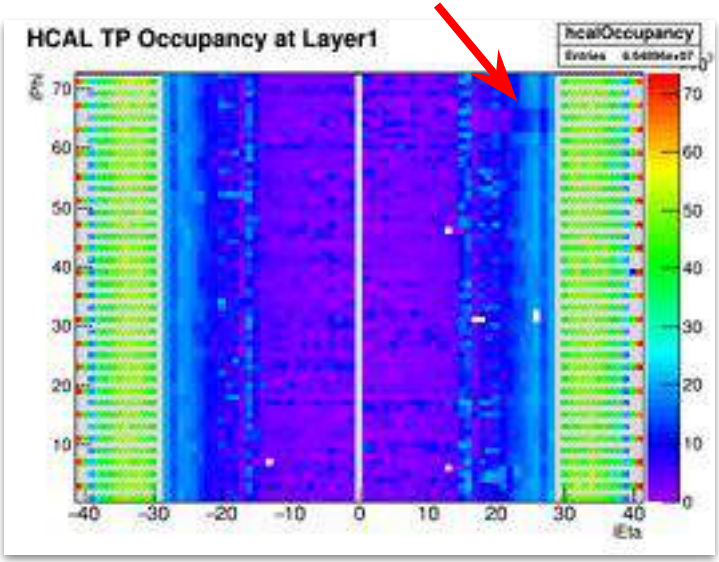
In this run we had a timing problem:
uGMT shows a shift +1 BX (should be centered at zero)

Major problem -- inform L1 DOC **immediately**!

Hole in EG, ECAL was not red-recycled at flat top



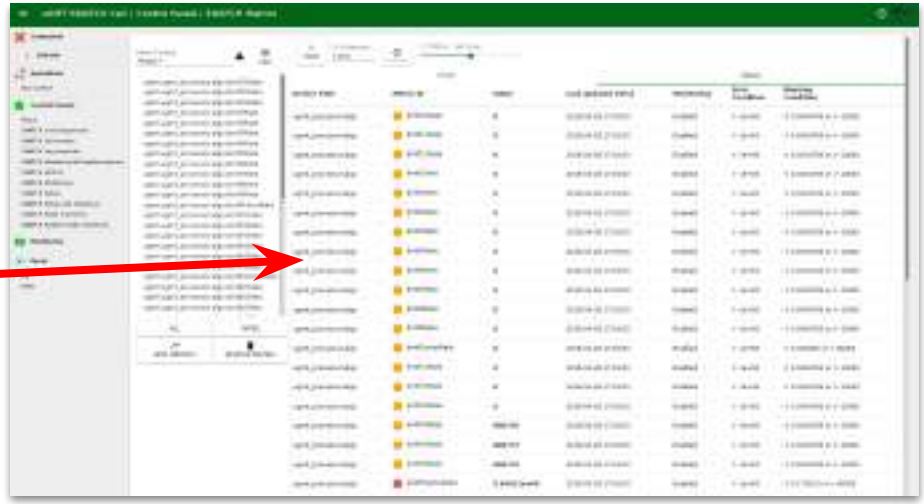
Not a problem: HE+17, new hardware, less noise

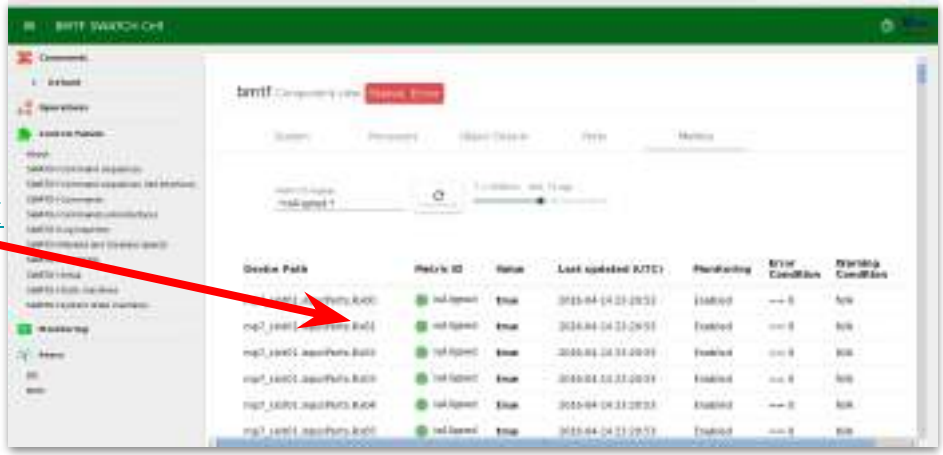


Subsystem Hardware

Some monitoring is available via the SWATCH cells

- uGMT (microTCA Global Muon Trigger)
  - Muon Rates (input and output)
  - Input status (disabled or enabled)
  - Input and Output port masking
  - Instructions here:
    - https://twiki.cern.ch/twiki/bin/view/CMS/TriggerShifterGuideUGMT
    - More examples on page
- BMTF (Barrel Muon Track Finder)
  - Muon Rates (output)
  - Input Rates and status
  - Instructions here:
    - https://twiki.cern.ch/twiki/bin/view/CMS/TriggerShifterGuideBMTF
    - More examples on page



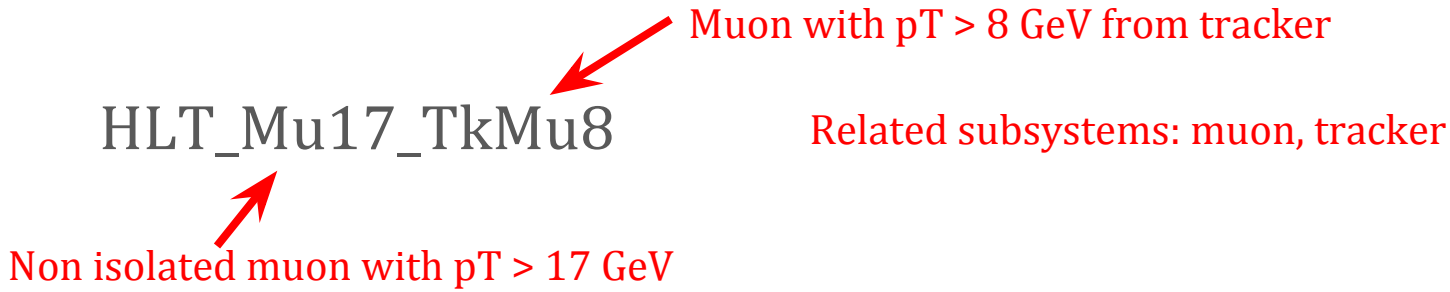


High Level Trigger

HLT: High Level Trigger (software based)

- The HLT consists of software filters which are executed on (partial) event data in a processor farm. Only data accepted by the HLT are recorded for offline physics analysis. Additionally, small samples of the data are retained for monitoring the performance of the HLT.
- The HLT contains hundreds of paths, each of which is seeded by one or more trigger at L1.

  Example:

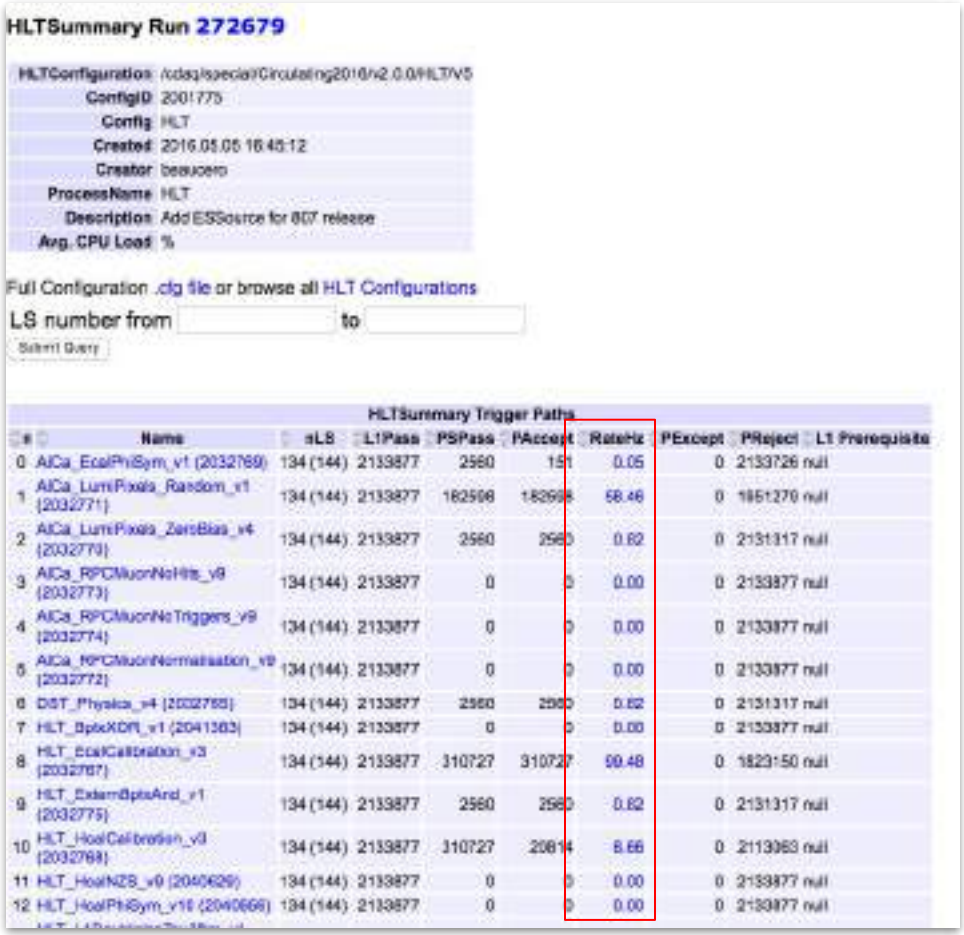


Monitoring HLT

Default monitoring of HLT output: http://es-cdaq.cms/sc/ratemeter.html (see earlier)

For monitoring **individual HLT trigger rates**: Open the run summary for the current run number (WBM ⇒ Run Summary) , see the Post-DT Rates:

- These are the rates into HLT
- If they are zero
  - A subsystem is stopping the triggers (TCDS->TTS)
  - Events are not being injected into the database (ask DAQ if the injection script is running)
  - Events are being written late (ask HLT or L1 DOCs to take a look)



HLT Rate Monitoring Script

Checks the rates of several key triggers (L1 and HLT) by comparing against a predicted rate.
If the difference between the actual rate and the predicted rate is too large, a visual and audio warning is enabled.

The script should be monitored and running continuously. If it crashes, restart the script and post an elog with the error.

- To stop the script:
  Ctrl+c

- To start the script see the instructions in the Twiki:
  https://twiki.cern.ch/twiki/bin/view/CMS/TriggerShifterGuideRateMonitoring#HLT_Rate_Monitoring

Additional information on the shifter script and HLT shifting:
https://twiki.cern.ch/twiki/bin/view/CMS/RateMonitoringScriptWithReferenceComparison

HLT Rate Monitoring Script: What to Expect

```
INFORMATION:
Run Number: 256868
LS Range: 0 - 692
Last LHC Status: Cycling
Number of colliding bunches: 1165
Trigger Mode: l1_hlt_collisions2015/v240 (collisions)
Number of HLT Triggers: 451
Number of L1 Triggers: 116
Number of streams: 14
```

Rates
Actual Expected Difference Deviation

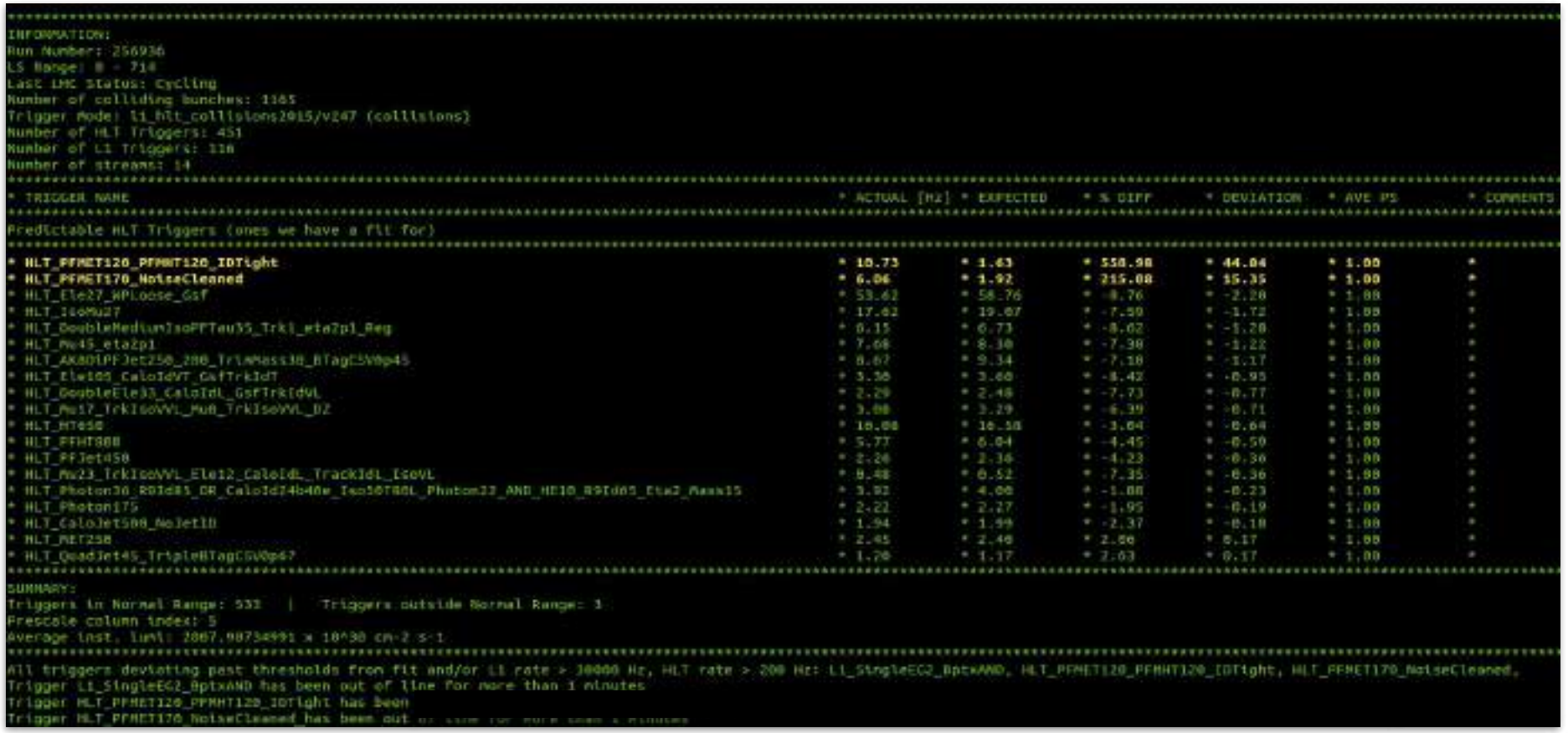
HLT Triggers

TRIGGER NAME	ACTUAL [Hz]	EXPECTED	% DIFF	DEVIATION	AVE PS	COMMENTS
Predictable HLT Triggers (ones we have a fit for)						
HLT_Ele27_HPLoose_Gsf	58.30	60.57	-3.76	-0.97	1.00	
HLT_PFMET170_NoiseCleaned	1.82	2.03	-10.63	-0.00	1.00	
HLT_PFMET120_PFMHT120_IDTight	1.50	1.71	-8.63	-0.73	1.00	
HLT_HT650	16.71	17.08	-2.18	-0.47	1.00	
HLT_Ele105_CaloIdVT_GsfTrkIdT	3.59	3.71	-3.38	-0.39	1.00	
HLT_Photon175	2.26	2.35	-3.76	-0.37	1.00	
HLT_MET250	2.40	2.49	-3.54	-0.38	1.00	
HLT_Photon36_R9Id85_OR_CaloId24b40e_Iso50T80L_Photon22_AND_HE10_R9Id65_Eta2_Mass15	4.01	4.11	-2.43	-0.38	1.00	
HLT_IsoMu27	19.44	19.65	-1.06	-0.25	1.00	
HLT_QuadJet45_TripleBTagCSV0p67	1.25	1.21	3.59	0.24	1.00	
HLT_Mu45_eta2p1	8.45	8.55	-1.15	-0.20	1.00	
HLT_PFHT800	6.13	6.22	-1.43	-0.20	1.00	
HLT_DoubleEle33_CaloIdL_GsfTrkIdVL	2.51	2.56	-1.85	-0.19	1.00	
HLT_DoubleMediumIsoPFTau35_Trk1_eta2p1_Reg	0.87	0.93	-8.94	-0.14	1.00	
HLT_PFJet450	2.39	2.41	-1.62	-0.14	1.00	
HLT_Mu23_TrkIsoVVL_Ele12_CaloIdL_TrackIdL_IsoVL	9.52	9.54	-2.61	-0.13	1.00	
HLT_CaloJet500_NoJetID	2.02	2.05	-1.54	-0.12	1.00	
HLT_AK8DiPFJet250_200_TrimMass30_BTagCSV0p45	9.57	9.63	-0.65	-0.11	1.00	
HLT_Mu17_TrkIsoVVL_Mu8_TrkIsoVVL_DZ	3.39	3.38	0.19	0.02	1.00	

```
SUMMARY:
Triggers in Normal Range: 515   |   Triggers outside Normal Range: 1
Prescale column index: 5
Average inst. lumi: 2060.66178301 x 10^30 cm-2 s-1
```

```
All triggers deviating past thresholds from fit and/or L1 rate > 30000 Hz, HLT rate > 200 Hz: L1_SingleEG2_BptxAND,
Trigger L1_SingleEG2_BptxAND has been out of line for more than 1 minutes
```

HLT Rate Monitoring Script: Warnings

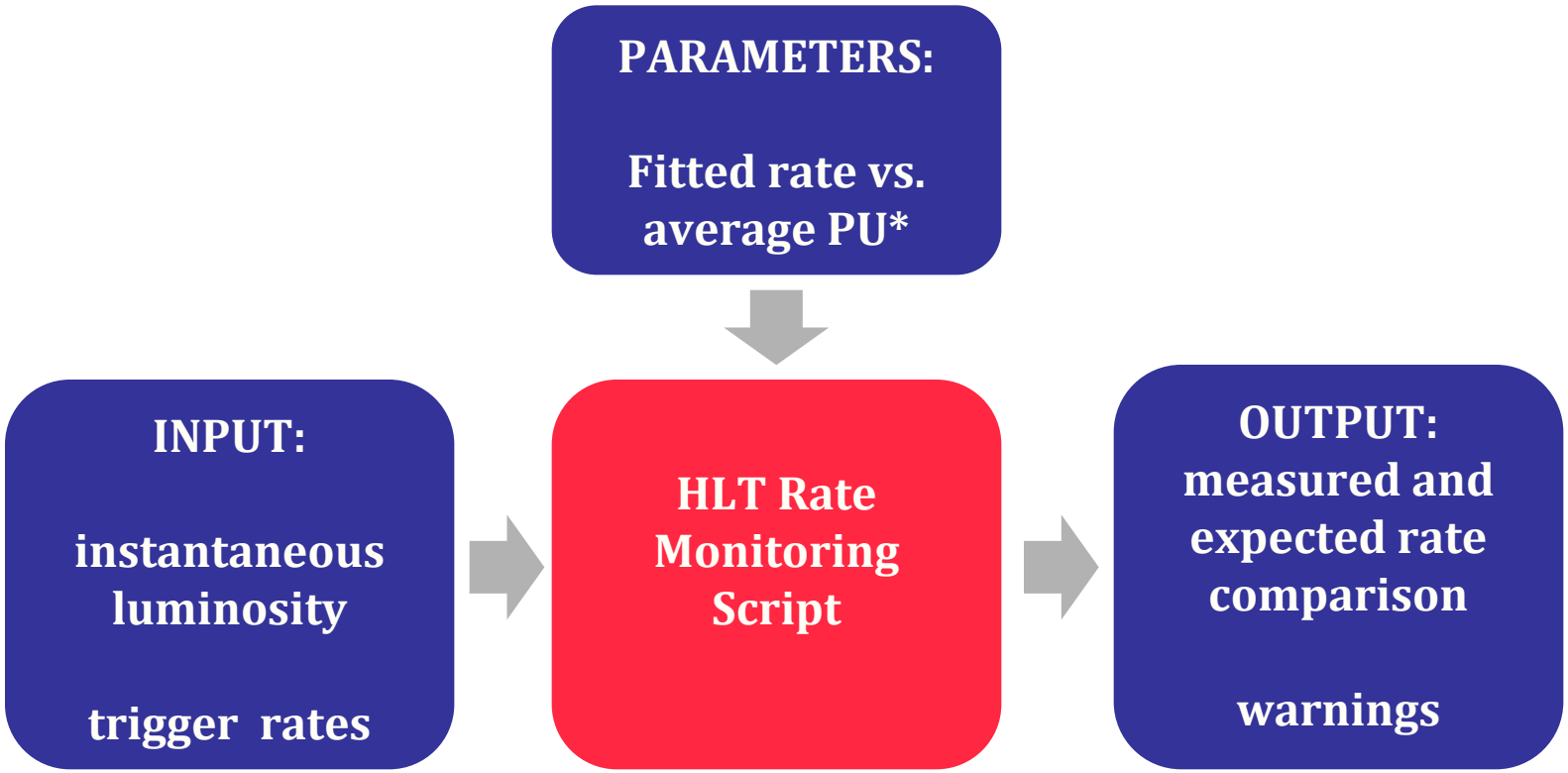


```
INFORMATION:
Run Number: 256936
LS Range: 0 - 714
Last LHC Status: Cycling
Number of colliding bunches: 1165
Trigger Mode: L1_Mtt_collisions2015/v247 (collisions)
Number of HLT Triggers: 451
Number of L1 Triggers: 110
Number of streams: 14

* TRIGGER NAME                                                    * ACTUAL [Hz] * EXPECTED    * % DIFF      * DEVIATION   * AVE PS      * COMMENTS

Predictable HLT Triggers (ones we have a fit for)

* HLT_PFMET120_PFMHT120_IDTight                                   * 10.73       * 1.63        * 558.98      * 44.04       * 1.00        *
* HLT_PFMET170_NoiseCleaned                                       * 6.06        * 1.92        * 215.08      * 15.35       * 1.00        *
* HLT_Ele27_WPLoose_Gsf                                           * 53.62       * 58.76       * -8.76       * -2.28       * 1.00        *
* HLT_IsoMu27                                                     * 17.02       * 19.07       * -7.59       * -1.72       * 1.00        *
* HLT_DoubleMediumIsoPFTau35_Trk1_eta2p1_Reg                      * 0.15        * 6.73        * -8.02       * -1.20       * 1.00        *
* HLT_Mu45_eta2p1                                                 * 7.68        * 8.30        * -7.30       * -1.22       * 1.00        *
* HLT_AK8DiPFJet250_200_TrimMass30_BTagCSV0p45                    * 8.67        * 9.34        * -7.10       * -1.17       * 1.00        *
* HLT_Ele105_CaloIdVT_GsfTrkIdT                                   * 5.36        * 5.60        * -8.42       * -0.95       * 1.00        *
* HLT_DoubleEle33_CaloIdL_GsfTrkIdVL                              * 2.29        * 2.48        * -7.73       * -0.77       * 1.00        *
* HLT_Mu17_TrkIsoVVL_Mu8_TrkIsoVVL_DZ                             * 3.08        * 3.29        * -6.39       * -0.71       * 1.00        *
* HLT_HT650                                                       * 10.08       * 10.58       * -3.84       * -0.64       * 1.00        *
* HLT_PFHT800                                                     * 5.77        * 6.04        * -4.45       * -0.59       * 1.00        *
* HLT_PFJet450                                                    * 2.26        * 2.36        * -4.23       * -0.36       * 1.00        *
* HLT_Mu23_TrkIsoVVL_Ele12_CaloIdL_TrackIdL_IsoVL                 * 0.48        * 0.52        * -7.35       * -0.36       * 1.00        *
* HLT_Photon36_R9Id85_OR_CaloId24b40e_Iso50T80L_Photon22_AND_HE10_R9Id65_Eta2_Mass15 * 3.92        * 4.08        * -1.88       * -0.23       * 1.00        *
* HLT_Photon175                                                   * 2.22        * 2.27        * -1.95       * -0.19       * 1.00        *
* HLT_CaloJet500_NoJetID                                          * 1.94        * 1.99        * -2.37       * -0.18       * 1.00        *
* HLT_MET250                                                      * 2.45        * 2.40        * 2.08        * 0.17        * 1.00        *
* HLT_QuadJet45_TripleBTagCSV0p67                                 * 1.20        * 1.17        * 2.63        * 0.17        * 1.00        *

SUMMARY:
Triggers in Normal Range: 533   |   Triggers outside Normal Range: 1
Prescale column index: 5
Average inst. lumi: 2807.98734991 x 10^30 cm-2 s-1

All triggers deviating past thresholds from fit and/or L1 rate > 30000 Hz, HLT rate > 200 Hz: L1_SingleEG2_BptxAND, HLT_PFMET120_PFMHT120_IDTight, HLT_PFMET170_NoiseCleaned,
Trigger L1_SingleEG2_BptxAND has been out of line for more than 1 minutes
Trigger HLT_PFMET120_PFMHT120_IDTight has been
Trigger HLT_PFMET170_NoiseCleaned has been out
```

In this example, there is a problem with occupancy in part of HF. The forward hadronic activity is mis-measured, leading to high rates for the missing energy paths.

Visual warning (yellow line), audio alarm, and email are sent.

HLT Rate Monitoring Script: Details



Rates and instantaneous luminosity are averaged over 3 of the last lumi sections (LS) in the ongoing run (each LS is about 23 seconds) and refreshed every minute.

*Pile-Up, the number of interactions per crossing

HLT Rate Monitoring Script: Details

The script **monitors a list of relevant triggers**, usually one for each type: single, double, isolated and non-isolated muons/electrons, photons, hadronic taus, PF and non-PF jets, b-tagged jets and missing energy

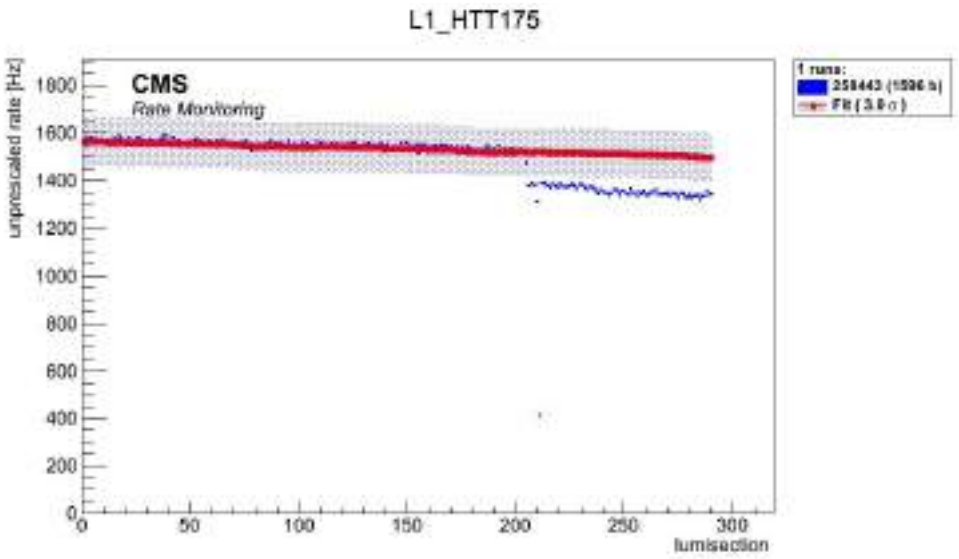
Compares expected rate (depending on the <PU>) and measured rate

- If the measured rate deviates more than 3 sigma for more than a minute, a warning is sent, and the HLT DOC is notified with an email

Example:

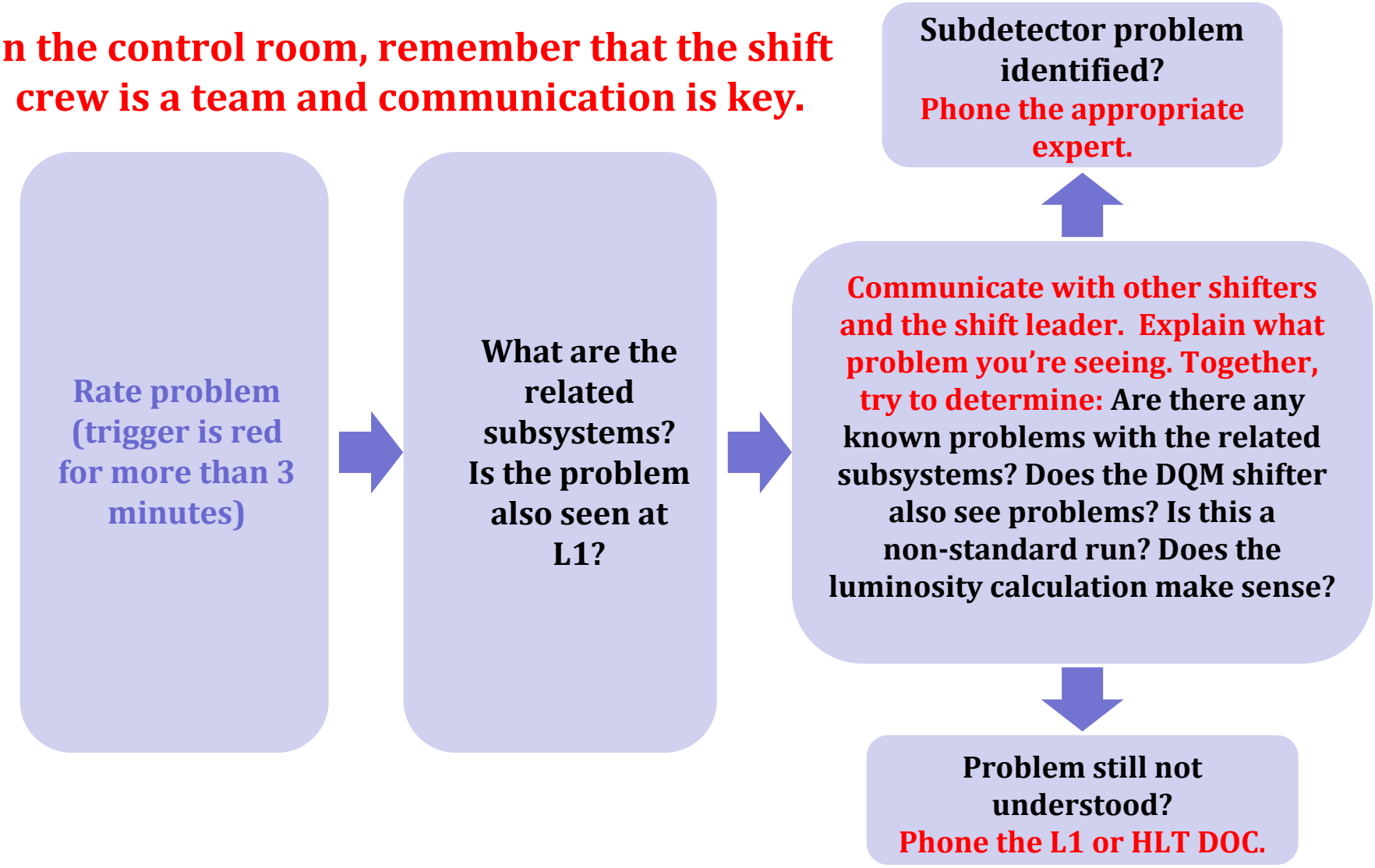
Problem with L1 calo triggers due to faulty link. Warning and email sent around LS 210.

Warnings also triggered by any L1/HLT trigger exceeding a fixed threshold



HLT Rate Monitoring Script: If there are rate problems

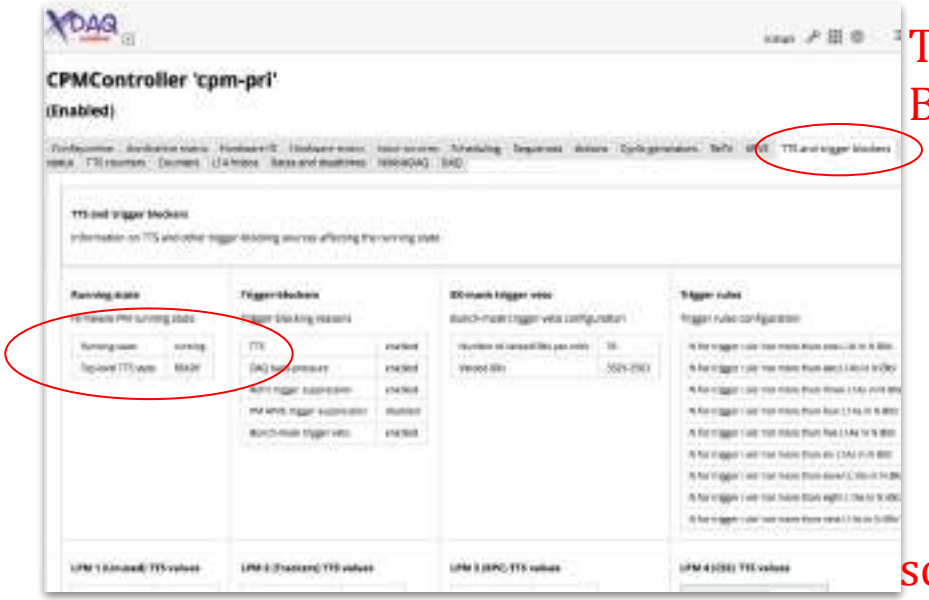
In the control room, remember that the shift crew is a team and communication is key.



Troubleshooting

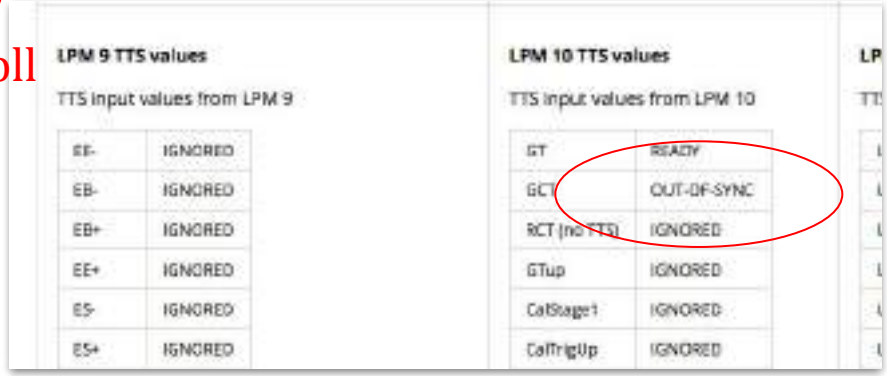
TTS States

If the trigger rate goes to zero DAQ shifter should check **TCDS CPM** to monitor Trigger Throttling System states



TTS and Trigger Blockers Tab

scroll

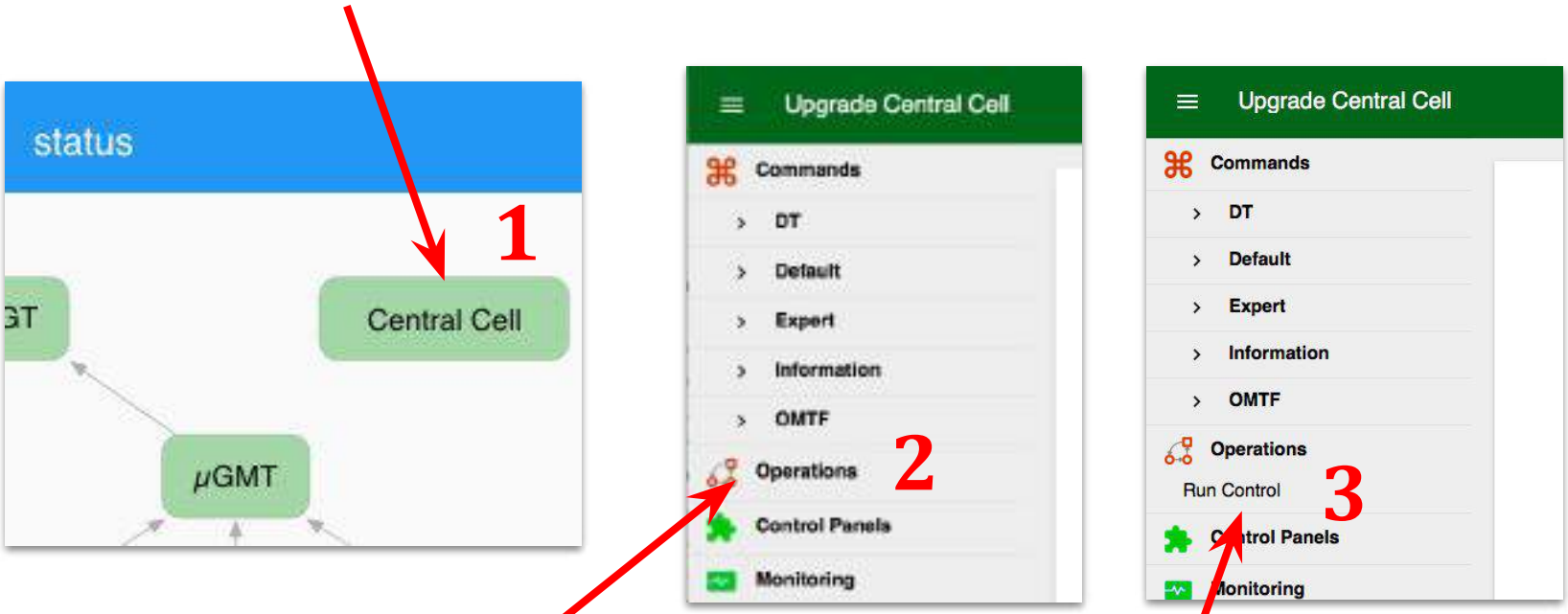


- Check this panel If the L1 Trigger stops triggering (post DT rate of zero)
  - this is the fastest way to see which subsystem is the cause (not **READY**)
- In case of Out of Sync – DAQ shifter may issue a RESYNC command
- In case of ERROR – DAQ shifter can try HARD RESET

If the trigger goes into error…

When the DAQ shifter tells you the Trigger is in error:

Open the Central Cell

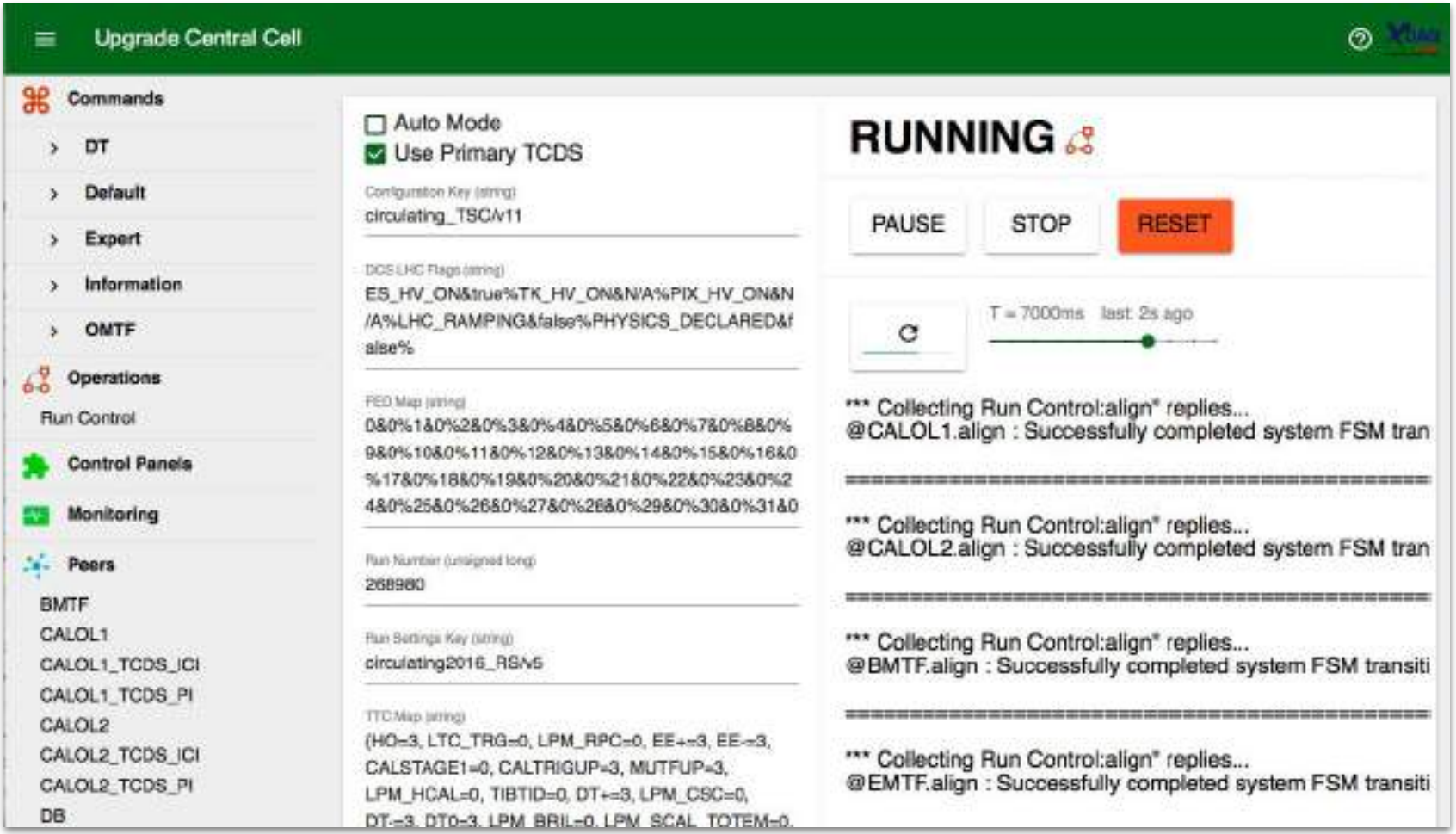


In the left menu click on "Operations"

Click on "Run Control"

If the trigger goes into error…

Here you can see the state of the Trigger
Scroll down (if necessary) to see error messages



4

Warning and Error Messages

Both a message and **the subsystem box** will change color

- Orange is a warning (with caution symbol)
- Red is an error (**without** crossbones symbol)
- Suggestions may appear on the right
- If you have any questions about them, **call the L1 DOC**
- When we are not running, more errors/warnings will appear
- **Restarting the software processes will not help these problems!**

Shift summary

Shift summary

At the end of your shift, post a summary in the Trigger elog

- It is easiest to write this to a file as the shift progresses and then copy/paste at the end
- Save the file periodically in case the PC crashes
- Use the shift workstation for this

The shift summary should contain

- A dense description of the main events in the shift
- Important changes in the trigger configuration
- Observations important for the next shift (at the top of the summary)
- Mark everything with a time stamp and if relevant, a run number

Shift summary should not contain

- Error reports/pastes – should be in a separate elog, a short note of it is all that is needed

Type: Shift summary

Subject: morning shift summary

```
instructions to pass to the next (and next-to-next) shifter for
the vdM scan:
1) call L1 doc at the start of the scan,
2) the HLT rate monitor script does not give useful info (don't
call HLT doc), stream A should be about 2kHz if this is not the
case (or in case of any doubt) call HLT.

-----------------------------------

07:00 - start of shift - run 195583 ongoing
      * l1_hlt_cosmics/v297
      * prescale column 0
      * Lv1 Rate ~1.5 kHz
      * Stream A rate ~100 Hz
      * Express rate ~12 Hz
      * DeadTime ~1.1%
      * LHC status: ramp down

08:35 - run stopped - exclude tracker

08:47 - run 195585 started
      * l1_hlt_collisions_2012/v112
      * prescale column 9
      * Lv1 Rate ~1.5 kHz
      * Stream A rate ~0 Hz
      * Express rate ~0 Hz
      * DeadTime ~1.1%
      * tracker is out
      * LHC status: cycling

08:57 - run stopped - to really start with column 9

08:57 - run 195586 started
      * l1_hlt_collisions_2012/v112
      * prescale column 9
      * Lv1 Rate ~1.5 kHz
      * Stream A rate ~0 Hz
      * Express rate ~0 Hz
      * DeadTime ~1.1%
      * tracker is out
      * LHC status: cycling

09:06 - run stopped - preshower error
```

```
10:36 - run 195601 started
      * l1_hlt_collisions_2012/v112
      * prescale column 9
      * Lv1 Rate ~1.4 kHz
      * Stream A rate ~0 Hz
      * Express rate ~0 Hz
      * DeadTime ~1.1%
      * ECAL is out
      * LHC status: injection probe beam

11:57 - run stopped - to include ECAL

12:01 - run 195602 started
      * l1_hlt_collisions_2012/v112
      * prescale column 2
      * Lv1 Rate ~1.3 kHz
      * Stream A rate ~5 Hz
      * Express rate ~0.2 Hz
      * DeadTime ~1.1%
      * everything in
      * LHC status: injection physics beam

12:24 - run stopped

12:32 - run 195606 started
      * l1_hlt_collisions_2012/v112
      * prescale column 9
      * Lv1 Rate ~1.5 kHz
      * Stream A rate ~0 Hz
      * Express rate ~0.0 Hz
      * DeadTime ~1.1%
      * LHC status: injection physics beam

14:30 - RPC in local mode, observed an increase in muon L1 rates

14:55 - end of shift - run 195606 ongoing
```

Instructions for next shifter

Details about start of run
(key, prescale column, Lv1 rate,
physics, express rates, deadtime,
LHC status, detector status, other notes)

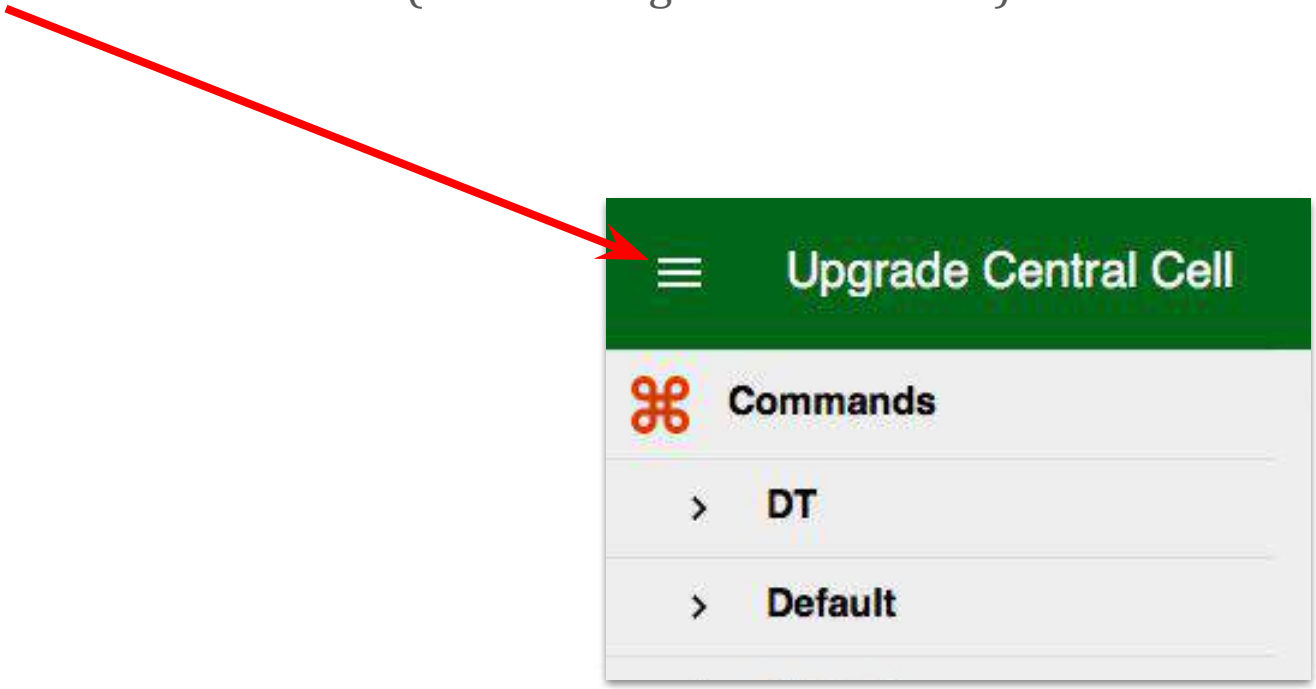
Why the run stopped

Issues, brief problem report
(real problems deserve a separate e-log)

Sign off, current run number

Trigger Tips and Tricks

Click on this to hide the menu (makes things easier to read)



The end… for now

Updates will be added as things change, please make sure you are on the following CERN e-group:

cms-online-trigger-shifts@cern.ch

Search here:

https://e-groups.cern.ch/e-groups/EgroupsSearchForm.do

Please send questions to:

hn-cms-trigger-shifts-online@cern.ch

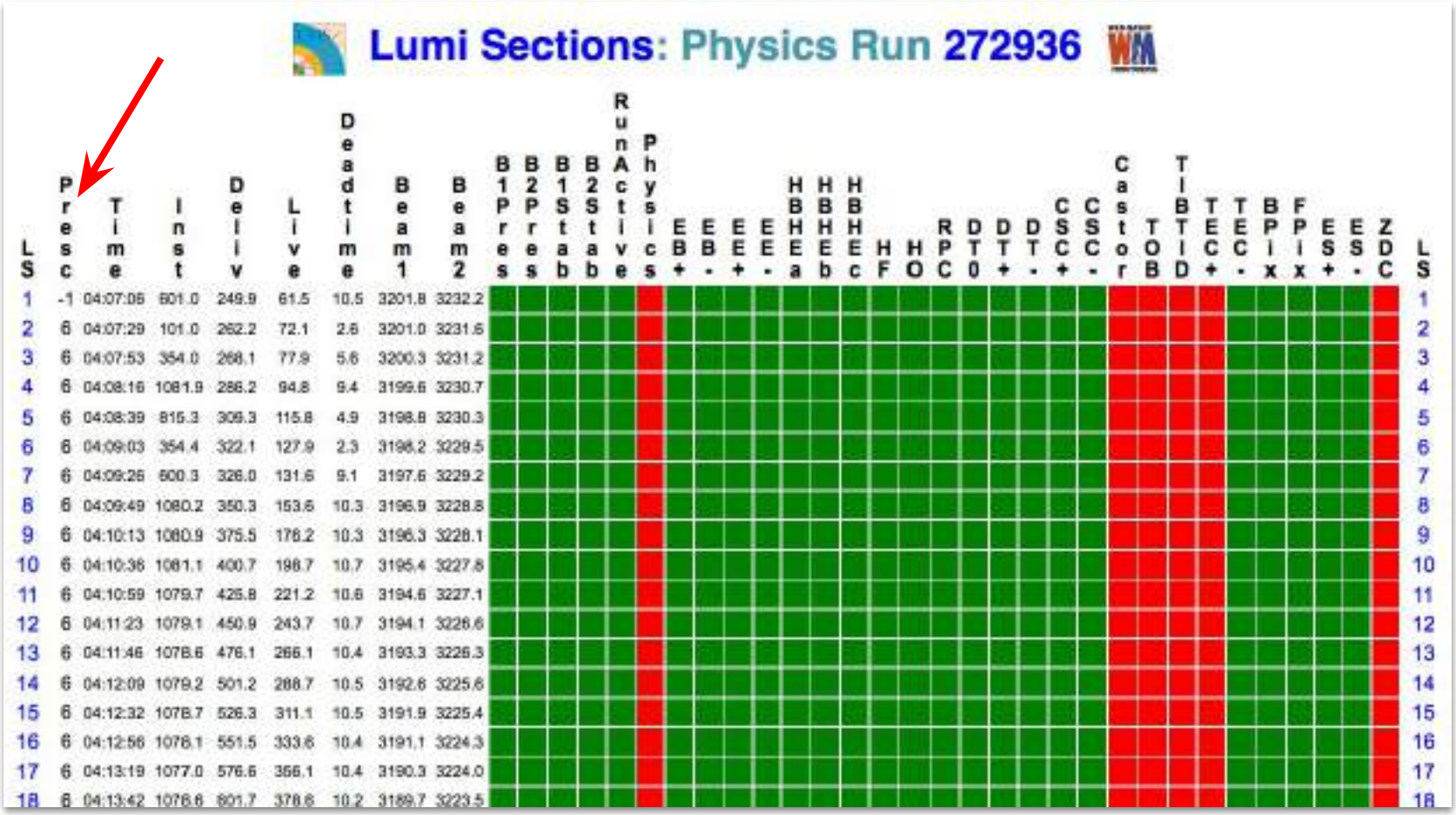
We'll answer and hopefully improve our documentation

Have fun and take lots of good data on your shift!

Prescale Information via WBM

Go to the Run Summary – click on Lumi Sections by "Other Services", then look at Column "Presc"

- e.g. https://cmswbm.web.cern.ch/cmswbm/cmsdb/servlet/LumiSections?RUN=272936



LS	Presc	Time	Inst	Deliv	Live	Deadtime	Beam1	Beam2	B1Press	B2Press	B1Stab	B2Stab	RunActive	Physics	EB+	EB-	EE+	EE-	HBHEa	HBHEb	HBHEc	HF	HO	RPC	DT0	DT+	DT-	CSC+	CSC-	Castor	TOB	TIBTID	TEC+	TEC-	BPix	FPix	ESS+	ESS-	ZDC	LS
1	-1	04:07:06	601.0	249.9	61.5	10.5	3201.8	3232.2																																1
2	6	04:07:29	101.0	262.2	72.1	2.6	3201.0	3231.6																																2
3	6	04:07:53	354.0	268.1	77.9	5.6	3200.3	3231.2																																3
4	6	04:08:16	1081.9	286.2	94.8	9.4	3199.6	3230.7																																4
5	6	04:08:39	815.3	309.3	115.8	4.9	3198.8	3230.3																																5
6	6	04:09:03	354.4	322.1	127.9	2.3	3198.2	3229.5																																6
7	6	04:09:26	600.3	326.0	131.6	9.1	3197.6	3229.2																																7
8	6	04:09:49	1080.2	350.3	153.6	10.3	3196.9	3228.8																																8
9	6	04:10:13	1080.9	375.5	176.2	10.3	3196.3	3228.1																																9
10	6	04:10:36	1081.1	400.7	198.7	10.7	3195.4	3227.8																																10
11	6	04:10:59	1079.7	425.8	221.2	10.6	3194.6	3227.1																																11
12	6	04:11:23	1079.1	450.9	243.7	10.7	3194.1	3226.6																																12
13	6	04:11:46	1078.6	476.1	266.1	10.4	3193.3	3226.3																																13
14	6	04:12:09	1079.2	501.2	288.7	10.5	3192.6	3225.6																																14
15	6	04:12:32	1078.7	526.3	311.1	10.5	3191.9	3225.4																																15
16	6	04:12:56	1078.1	551.5	333.6	10.4	3191.1	3224.3																																16
17	6	04:13:19	1077.0	576.6	356.1	10.4	3190.3	3224.0																																17
18	6	04:13:42	1076.6	601.7	378.6	10.2	3189.7	3223.5																																18

Jargon cheat-sheet

- FINOR = Output of the uGT (algorithms), on uGT page
- FINOR = L1A Physics* + TriggerPhysicsLost* = PhysicsGeneratedFDL (TCDS)*
- L1 Rate = FINOR + Random (600Hz) + Calibration (100 Hz)
  - Random may be something other than 600 Hz during tests
- L1 Rate (Post-Deadtime) = L1 Rate – Suppressed Triggers
  - This is the rate INTO the HLT
  - Deadtime % = # of BX where triggers could be accepted / # of BX
    - Beam Active is only for colliding bunches
  - Triggers suppressed by
    - Trigger Rules – 1 trigger in 3 BX, etc.
    - Trigger Throttling – Subdetector is busy state, in error, etc.
      - This becomes the dominant cause of deadtime at very high (100 kHz) rate
    - Hard reset, resync sequences, calibration sequence
- Physics Stream = rate out of the HLT
- Express Stream = subset of Physics for quick analysis
- Name changes depending on run type, e.g. ExpressCosmics,
- Event Size = Size of event data written to storage media

*from WBM