

Trigger update

Menus in release 13

Estimated rates

Trigger and Higgs analyses

Outlook

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Releases & menus

- Latest production cache 13.0.30.3
- Menus for trigger performance section of detector paper and for CSC production
- Release 13.0.40 coming out soon
 - Most likely this week but a few tags still needed today to fix remaining problems
 - 10^{31} and 10^{32} menus
 - Functionality needed for FDR I

Currently available menus in Python and XML

Menus in 13.0.30.1: [default*](#)

Menus in 13.0.30.2: [default*](#) | [default_no_Bphysics_no_prescale*](#) | [lumi1E31*](#) | [lumi1E31_no_prescale*](#) | [lumi1E31_no_Bphysics*](#) | [lumi1E31_no_Bphysics_no_prescale*](#) | [lumi1E32*](#) | [lumi1E32_13.0.30.2_no_prescale*](#) | [lumi1E32_no_Bphysics*](#) | [lumi1E32_no_Bphysics_no_prescale*](#)

Menus in 13.0.30.3:

Lumi/option	full	1E31	1E32
with prescales	full*	lumi1E31*	lumi1E32*
no prescale	full_no_prescale* [DEFAULT]	lumi1E31_no_prescale*	lumi1E32_no_prescale*
no Bphysics	full_no_Bphysics*	lumi1E31_no_Bphysics*	lumi1E32_no_Bphysics*
no Bphysics no prescale	full_no_Bphysics_no_prescale*	lumi1E31_no_Bphysics_no_prescale*	lumi1E32_no_Bphysics_no_prescale*

+ [default*](#)

Menus in 13.0.40 (FDR):

Lumi/option	full	1E31	1E32
with prescales	full*	lumi1E31*	lumi1E32*
no prescale	full_no_prescale* [DEFAULT]	lumi1E31_no_prescale*	lumi1E32_no_prescale*
no Bphysics	full_no_Bphysics*	lumi1E31_no_Bphysics*	lumi1E32_no_Bphysics*
no Bphysics no prescale	full_no_Bphysics_no_prescale*	lumi1E31_no_Bphysics_no_prescale*	lumi1E32_no_Bphysics_no_prescale*

*) the menu name is a value of flag [TriggerFlags.triggerMenuSetup](#). i.e. setting [TriggerFlags.triggerMenuSetup](#) = "full_no_Bphysics" in 13.0.30.3 one runs this menu

- https://twiki.cern.ch/twiki/bin/view/Atlas/TriggerConfigPython#Currently_available_menus_in_Pyt

EF chains details

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name	PS	PT	counter	Lower Chain	signatures
EF_e20_xe15	1	0	231	L2_e20_xe15	1: EF_e20calo x1 2: EF_e20id x1 EF_xe15 x1 3: EF_e20 x1 EF_xe15 x1
EF_JE340	1	0	126	L2_JE340	1: EF_je340 x1
EF_3b23_4L1J23_passHLT	1	0	264	L2_3b23_4L1J23_passHLT	1: EF_b23 x3
EF_b42	1	1	154	L2_b42	1: EF_b42 x1
EF_xe20	1	0	143	L2_xe20	2: EF_xe20 x1
EF_xe25	1	0	144	L2_xe25	2: EF_xe25 x1
EF_te650	1	0	141	L2_te650	2: EF_te650 x1
EF_e25i_tight	1	0	300	L2_e25i_tight	1: EF_e25i_tightcalo x1 2: EF_e25i_tightid x1 3: EF_e25i_tight x1
EF_e15i	1	0	5	L2_e15i	1: EF_e15icalo x1 2: EF_e15iid x1 3: EF_e15i x1
EF_3b18_4L1J18_passHLT	1	0	263	L2_3b18_4L1J18_passHLT	1: EF_b18 x3
EF_b35	1	1	153	L2_b35	1: EF_b35 x1
name	PS	PT	counter	Lower Chain	signatures
EF_e12	1	0	31	L2_e12	1: EF_e12calo x1 2: EF_e12id x1 3: EF_e12 x1
EF_e15	1	0	3	L2_e15	1: EF_e15calo x1 2: EF_e15id x1 3: EF_e15 x1
EF_2e5	1	0	60	L2_2e5	1: EF_e5calo x2 2: EF_e5id x2 3: EF_e5 x2
EF_eNoCut	10000000	0	275	L2_eNoCut	1: EF_eNoCutcalo x1 2: EF_eNoCutid x1 3: EF_eNoCut x1
EF_xe15	1	0	142	L2_xe15	2: EF_xe15 x1
EF_J10	1	10	104	L2_J10	1: EF_j10 x1
EF_3b18_4L1J18	1	0	256	L2_3b18_4L1J18	1: EF_b18 x3
EF_tau25i_mu20	1	0	290	L2_tau25i_mu20	1: EFtau25iclf0 x1 EFID_mu20 x1 2: EFtau25itr x1 EF_mu20 x1 3: EF_tau25i x1 EF_mu20 x1
EF_J400	1	0	308	L2_J400	1: EF_j400 x1
EF_mu10	10	0	130	L2_mu10	1: EFID_mu10 x1 2: EF_mu10 x1
EF_mu15	10	0	131	L2_mu15	1: EFID_mu15 x1 2: EF_mu15 x1
EF_g15i	1	0	38	L2_g15i	1: EF_g15icalo x1 2: EF_g15i x1
EF_2b35_3L1J35_passHLT	1	0	259	L2_2b35_3L1J35_passHLT	1: EF_b35 x2
EF_2e15	1	0	54	L2_2e15	1: EF_e15_loosecalo x2 2: EF_e15_looseid x2 3: EF_e15_loose x2
EF_g25_L32	1	0	294	L2_g25_L32	1: EF_g25_tightcalo x1 2: EF_g25_tight x1
EF_te250	1	0	139	L2_te250	2: EF_te250 x1
EF_2b70_3L1J42	1	0	255	L2_2b70_3L1J42	1: EF_b70 x2

- https://twiki.cern.ch/twiki/bin/view/Atlas/TriggerConfigPython#Currently_available_menus_in_Pyt

Trigger rates

- The trigger rates with the new 10^{31} menu have been evaluated regularly
- See M-A Dufour's talk in TDAQ Week (<http://indico.cern.ch/conferenceDisplay.py?confId=23914#2007-11-29>)
- Using a set of validated tools
- About 6.4×10^6 minimum-bias events used

Event Filter				
Slice	Rate (Hz)		Cumulative Rate (Hz)	
Jet	93.08	(± 0.04)	93.08	(± 0.04)
bjets	24.7	(± 0.1)	111.45	(± 0.05)
Electron	59.0	(± 0.1)	166.73	(± 0.07)
Photon	7.83	(± 0.02)	172.42	(± 0.07)
Tau	20.74	(± 0.04)	187.11	(± 0.08)
Muon	64	(± 1)	250.5	(± 0.1)
Missing E_T	37.98	(± 0.04)	281.8	(± 0.1)
Total E	10.680	(± 0.007)	291.6	(± 0.1)
Total Jet E	0.44	(± 0.01)	291.7	(± 0.1)
Topological + B-physics	28	(± 2)	313.7	(± 0.1)
Combined	56	(± 1)	337.6	(± 0.1)
Minimum Bias	3.954	(± 0.005)	341.6	(± 0.1)

- Existing rate estimates are for $10^{31} \text{cm}^{-2}\text{s}^{-1}$
- Extrapolating to e.g. 10^{33} not linear:
 - Pileup, processing time, optimization for different luminosities...
- Large uncertainty still remains from total cross section, underlying event, pi and K decay in flight, etc
- Nevertheless, multiply by 100 to get rough estimate for 10^{33}
- Lowest threshold unrescaled signatures at 10^{31} :
 - Jets: j100 (16Hz) (pass HLT); 4j23 (5.3Hz)
 - Forward jets: FJ120 (1.5Hz)
 - Electrons: e10i tight (34Hz); e25i tight (0.7Hz)
 - Photons: g20 (7Hz)
 - Taus: tau60 (11Hz); 2tau25i (2.6Hz)
 - Muons: mu10 (19Hz); mu20 (1.7Hz)
 - Missing ET: xe70 (2.0Hz)

Higgs analyses

- Possible problems identified in HG9 and HG10 analyses
 - Charged Higgs - In light H^+ decay to hadronic tau, existing trigger tau20i_xe30 would produce a very high rate ($5.8 @ 10^{31}$). Impact on analysis efficiency may be large
 - Chris Potter investigating tau+xe+N jets
 - Invisible Higgs in VBF - existing trigger j42_xe30 has too-high jet threshold. Also, would benefit from forward jet HLT selection (not implemented until recently)
 - Malachi Schram investigating new trigger with lower jet threshold and including FCAL; also testing forward jet HLT selection
- Aim to present studies of new triggers at Trigger Menu meeting on the 17th January

Outlook

- Trigger menu now quite complete in rel.13
- Rate estimates now solid (modulo some uncertainties in physics processes)
- FDR II may use 10^{32} menu instead of 10^{33}
- Many open questions on what signatures will be viable at high lumi - some questions start to be answered
- Monthly Trigger Menu meetings from January 17
- Idea is to get input from trigger-aware analyses: <https://hypernews.cern.ch/HyperNews/Atlas/get/trigger-menus/18.html>
- Later should start to think how to verify the trigger efficiency from data
- Workshop early in 2008

