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

rkshop at CER... | http://indico.cern.ch/ge... | TriggerConfigPython < ...

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*

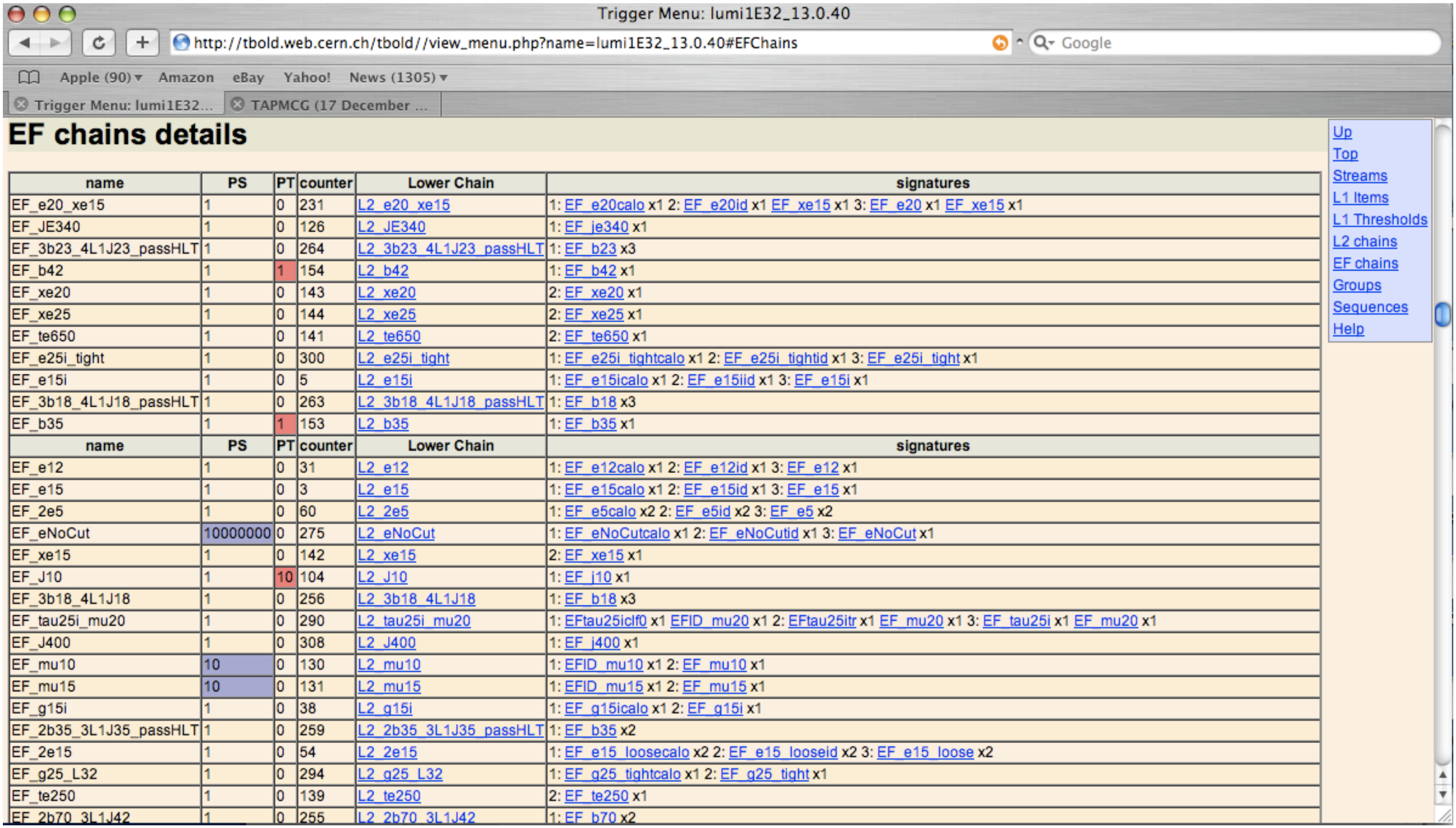
+ default*

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



- 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 $10^{31}cm^{-2}s^{-1}$
- 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 unprescaled 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 Menus 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 January17
  - 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