Preparations for first Physics

- Outline:
  - Intro to today's meeting focused on the 1st Paper on 1st data
  - Physics datasets for 1st data (900 GeV, 2TeV)
  - Plan for regular Monday, Friday meetings (starting Monday)
    - Other analyses on 1st Data
    - Initial 7 TeV datasets and their evolution with integrated lumi.
    - Data placement
      - 1st meeting Monday 23rd at 18.00 in 40-5A-01

1st results & 1st paper with collider data

- Need high quality results fast
  - CERN requested all experiments to present results "soon after we take the data" at 900 GeV
  - CMS Physics focus for 1st results to go public: Charged particle pseudorapidity and pt distributions
    - Also other analyses (discussed later), but less rushed
  - Organize a team across all relevant groups to assure high quality in a short amount of time. Address the following:
    - How to determine all the numbers in the current draft notes
      - Convince CMS measurements & uncertainties are solid
      - Update the corresponding Analysis Notes
        - The critical backup documentation for approval.
  - Begin work on a draft publication

1st CMS physics results on collider data

- Special considerations because it is the 1st.
  - The 1st public display of the fruits of our labor
  - It is an "All CMS" paper
  - Must be ready fast
  - The 1st publication would combine the analyses [the pixel hit counting and the full tracking methods]
    - For expediency and due to the obvious overlap of topics and expertise.
      - If one analysis gets significantly delayed with respect to the other, it may be necessary to proceed with just one in the 1st paper, and the other in a subsequent one..
  - The publication board will help to draft the paper and get it to publication quality
    - In the interest of speed this would happen in parallel with the work to prepare and carry out the analyses, understand all systematics, and document it all in analysis notes.
  - NOTE: If, in an incredible show from the machine, we get to 2 TeV data really fast, we may reconsider how much of that data to include as well. For now, our baseline is to get the 900 GeV results quickly for the CERN presentation and this 1st publication.

Goals for today

- Hear from key areas needed for the 1st paper
  - Commissioning, Trigger, Tracker DPG, Tracker POG, QCD
- Begin to understand the detailed plan of work
- Form a team that cuts across all the relevant areas to address the work plan.
  - The key elements of this measurement are trigger and tracker performance, efficient data-taking, and tracking.
  - We need experts from these areas on this team if we are to get high quality results and hopefully get them quickly!

More 900 GeV (2.2 TeV) data analysis

- Our first collision data:
  - Opportunity for all Groups (PAG/POG/DPG)
  - Need to squeeze out all the interesting information
- Data can be used for
  - Physics measurements
    - dN/dη as discussed today but also Underlying Event, FWD physics, possibly J/ψ's if we get "2+" TeV etc.
  - Calibration and alignment studies
  - Tests of complex future analyses (e.g. isolation criteria)
  - Training (finally move out from MC phase … !)
- Lots of possible "**activities**"

900 GeV (2.2 TeV) preparation

- Need coordinated effort in order to be efficientl:
  - Define the interesting 900 GeV (2+ TeV) activities
  - Define useful datasets
  - Distribute them broadly to T2's with the shortest delay
  - Join efforts to overcome difficulties
  - Establish a quick communication channel

→ What we faced in the October exercise

So we can use the exercise as a guide.

Proposal

- Each DPG/POG/PAG define their relevant **activities**
  - Fewer than OCT X: focus on the really important studies
  - Some groups (QCD, Tracking, e/γ, μ) with more than one
    - Others may just want to define one activity for training
  - The DPGs may want to pick out the activities for which participation in a communication forum could benefit
- Some results (plots) shown at the CERN seminar
  - So need to be thorough but efficient and fast

Organizational Issues

- Three meetings per week [Mon 18:00, Wed 15:00 (plenary), Fri 14:00]
  - Mon and Fri will mostly focus on PAG, POG-DPG issues
    - Quick minutes after Mon, Fri meetings: these will last typically one hour
  - Wednesday plenary includes all major coordination areas
    - Rooms being secured
- HN Forum
- Main TWiKi and TWiKi for each exercise ala OCT X

Kick off mtg Mon. 23rd at 18:00 in 40-5A-01

Datasets

- Now have a draft plan for first collisions
  - Draft of Stream A Physics datasets discussed here
- Have draft 8E29 trigger menu, PDs and SDs
  - Need to integrate OCT X experience & PH needs into SD design
  - Need to prepare a plan and tools for how we'll modify datasets (with changes to the triggers) for the reality of real data
- Higher luminosities
  - We'll design higher lumi trigger menus based on existing MC-based menus (1E31, 1E32) and experience with data
  - How will we evolve PDs, SDs, and add Central Skims (CS)?
    - Need to think about this now - from simple things like naming conventions… to how and where we will produce, validate, distribute, re-reco…

Physics Datasets: 900 GeV (2.2 TeV) Considerations

- Content is driven by the (very limited) physics
  - O(1 Hz) interesting events (8E29 menu, no L3 rejection)
  - O(100-600 Hz) Min Bias (no prescale)
  - O(500-1000 Hz) Zero Bias (Stream B – see backup slides)
- Observe general guidelines (as used for 8E29)
  - Reasonably similar sizes for PDs & not too much overlap
  - No PD too large to be distributed to 3rd largest T1

Draft startup plan

- Primary Datasets - O(200 Hz)
  1. Min Bias - O(100 Hz) – currently est. to be 100% of these triggers
  2. Zero Bias - O(100 Hz) – roughly 1 % of these triggers
  3. "Startup Physics" - O(20 Hz)
     - O(1Hz) all "interesting events" + O(10 Hz) of Min Bias (~10%) + O(10 Hz) of Zero Bias (~0.1 %)
       - Rates/fractions of min & zero bias are not fixed in stone yet, but PD#3 should be "portable"

  NB: May need tweaking when we see real trigger rates (but the basic idea will remain same).
- Physics Secondary Dataset - O(few Hz)
  1. All of the interesting events O(1 Hz) (and O(2 Hz) of Min + Zero bias?)
- Physics Express Stream (ES) - O(20 Hz)
  - PD#3 above – Startup Physics
- Why these choices?
  - PD#1 is all the min bias and not unreasonable in size (events are small)
  - **PD#3** has the most interesting events + plenty of min & zero bias
    - Adequate for most studies and to setup the others for running on higher stats min & zero bias
  - **ES=PD#3**= the most comprehensive and versatile sample. Rate comparable to our target for higher Lumi
  - **SD#1** pulls out all of the "very interesting" events while remaining "laptopable"

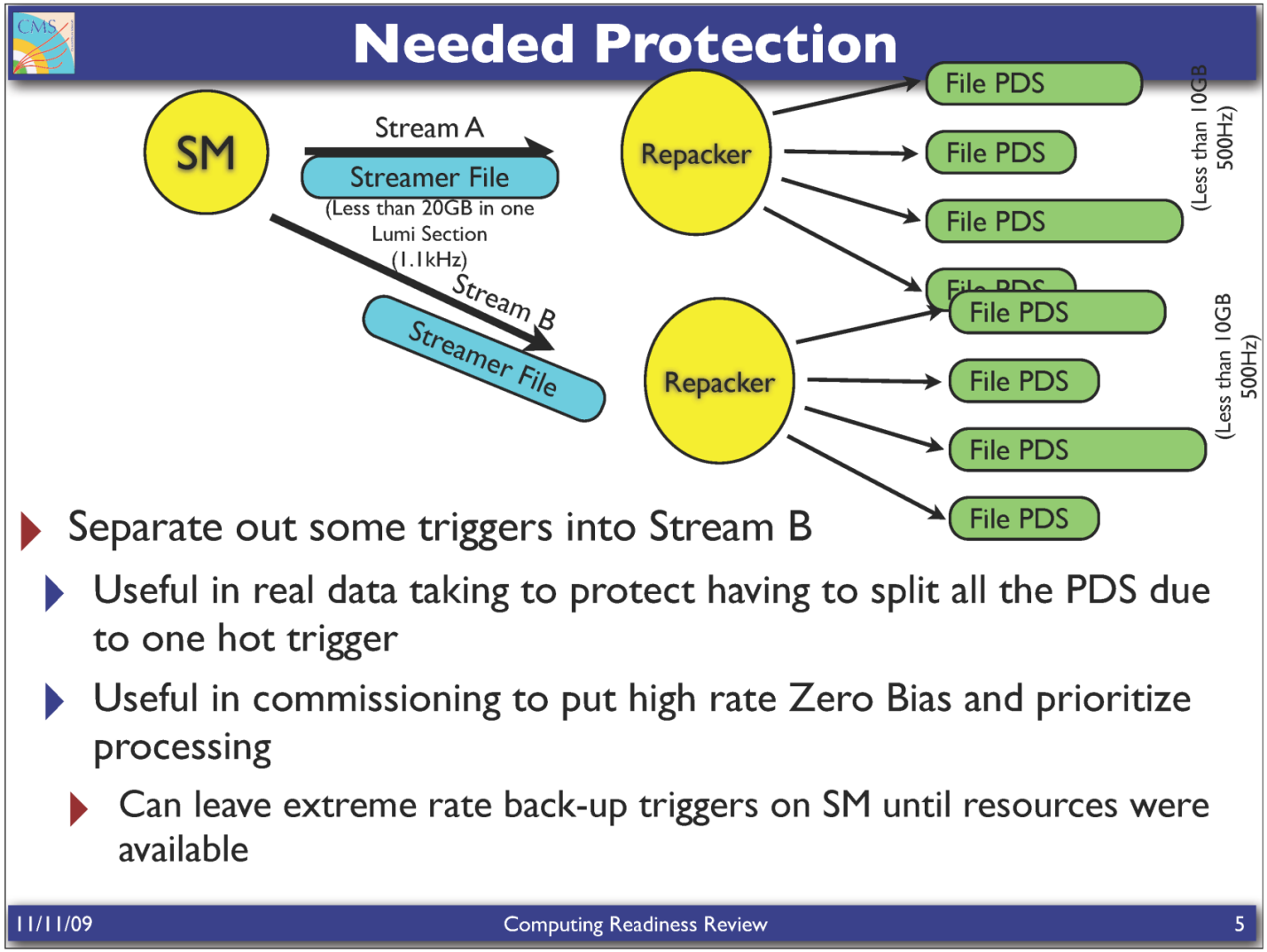
- Make first data accessible to all of CMS quickly:
  - E.g. SD#1 - 24 hours of recorded collisions with 300 kB/event at 2 Hz = 52 GB
  - Can distribute SD#1 quickly and just about everywhere
  - PD#3 would also be something we would work to distribute broadly

Datasets Evolution

- First stage: getting to 8E29
  - Have a draft of 8E29 PDs and SDs (see backup slides)
  - Will need modifications once we see real data
  - We will need a plan for how to evolve them for higher luminosities as the triggers evolve.
    - Changes, new datasets, central skims etc.
- Discussions in the Mon, Fri meetings (mentioned earlier) and the TSG

Additional Info

Scenario for Startup*
Stream A (standard), Stream B (backup)

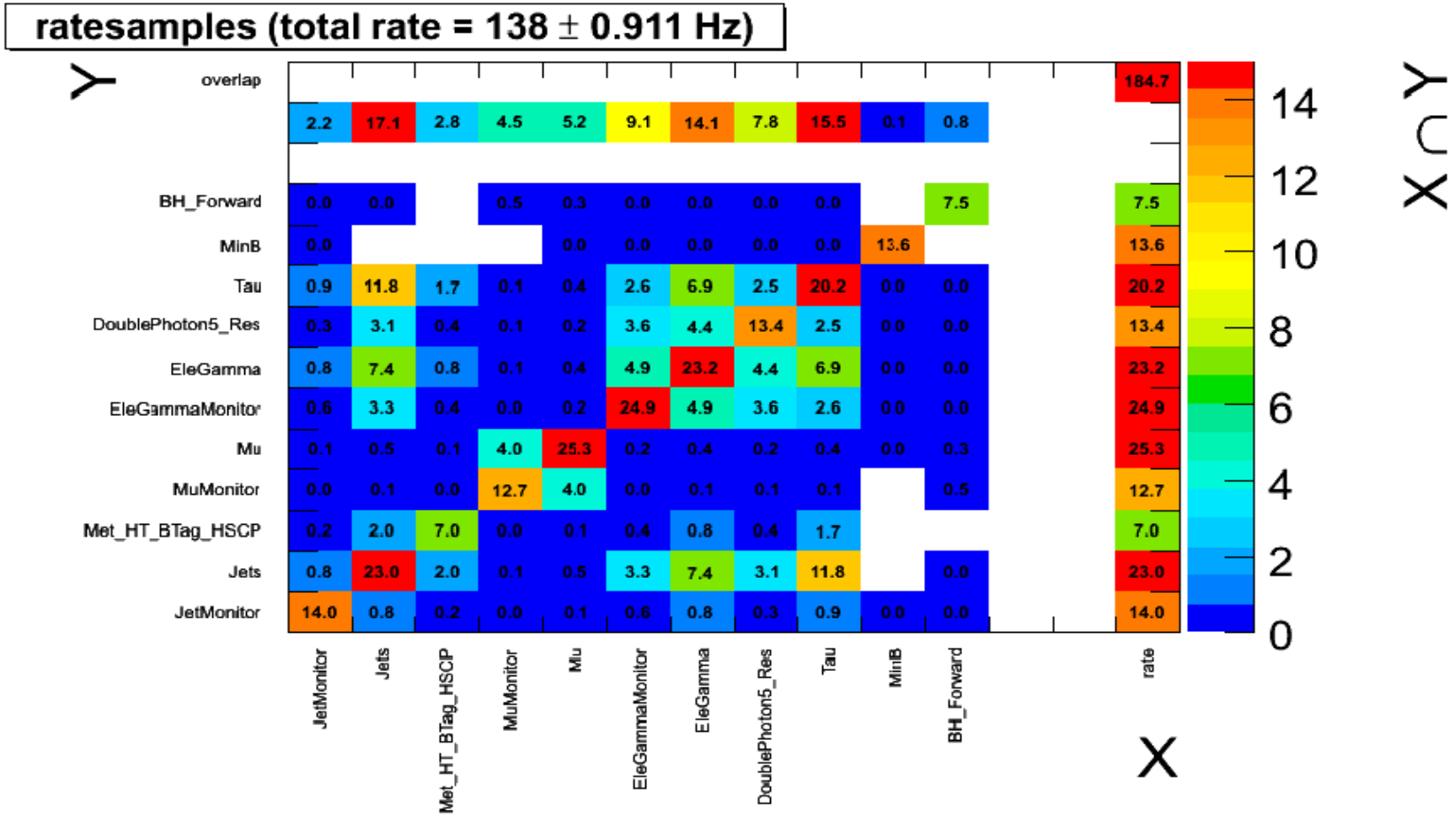


*Ian Fisk – Computing Readiness Review Nov.11, 2009
http://indico.cern.ch/conferenceDisplay.py?confId=73524

PD summary @ L=8E29

Dataset	Rate (Hz)
JetMonitor	14.04
Jets	22.97
Met_HT_BTag_HSCP	8
MuMonitor	12.74
Mu	25.34
EleGammaMonitor	24.87
EleGamma	23.19
DoublePhoton5_Res	13.35
Tau	20.17
MinB	13.59
BH_Forward	7.48
TOTAL TABLE RATE	139.2
TOTAL DATA ON DISK	185.74
TOTAL OVERLAP	34%

PD correlation @ L=8E29



The total overlap among all the PDs is 34%

8e29 SD's: First iteration as used in OCT X

Sample ID	Sample	# events	Xsec	Equivalent Lumi (pb-1)	JetMonitor			Jets			Met_HT_BTag_	MuMonitor		Mu						EGMonitor			EleGamma				DoubleEleGamm			Tau		MinB			BH_Forward	TOT
1000000	/MinBias	3.00E+07	7.53E+10	0.00040	1	1	1				1		1	1																	1	1	1	1	11
1002010	/QCD_Pt15	5.00E+06	1.46E+09	0.00343	1	1	1				1		1	1			1	1		1	1	1	1	1	1	1	1	1	1							18
1002020	/QCD_Pt30	2.00E+06	1.09E+08	0.01835				1	1	1	1			1	1								1	1		1	1	1	1	1					13
1002030	/QCD_Pt80	2.00E+06	1.94E+06	1.03306				1	1	1	1												1	1											6
1011010	/QCD_EMEnriched_Pt20to30	3.00E+07	3.20E+06	9.37500																			1	1					1	1					4
1011020	/QCD_EMEnriched_Pt30to80	4.00E+07	4.70E+06	8.51064																			1	1					1	1					4
1011030	/QCD_EMEnriched_Pt80to170	5.00E+06	2.85E+05	17.54386																			1	1					1	1					4
1089000	/ppMuMuX	1.00E+06	1.10E+06	0.90560										1		1			1																3
1088000	/ppMuX	1.00E+07	1.19E+08	0.08426										1		1			1																3
1023010	/InclusiveMu5_Pt50	5.00E+06	3.64E+05	13.73626							1				1		1	1																	4
1023020	/InclusiveMu5_Pt150	5.00E+05	6.78E+03	73.74631							1				1																				2
1012010	/QCD_BCtoE_Pt20to30	2.00E+06	1.92E+05	10.41667																			1	1					1	1					4
1012020	/QCD_BCtoE_Pt30to80	2.00E+06	2.40E+05	8.33333																			1	1					1	1					4
1012030	/QCD_BCtoE_Pt80to170	1.00E+06	2.28E+04	43.85965																			1	1					1	1					4
1040000	/Ttbar	5.00E+05	4.14E+02	1207.72947													1	1	1				1	1	1	1									7
1054000	/Wenu	2.00E+06	1.18E+04	168.91892																			1	1	1	1									4
1053000	/Wmunu	2.00E+06	1.18E+04	168.91892													1	1																	2
1071010	/Zee	2.00E+06	1.94E+03	1028.80658																			1	1	1	1			1						5
1071020	/Zmumu	2.00E+06	1.94E+03	1028.80658													1	1	1																3
					2	2	2	2	2	2	4	2	2	2	2	2	4	3	2	1	1	1	7	7	3	3	2	2	2	7	7	1	1	1	1	105
					SD_L1Jet6	SD_Jet15U	CS_DiJetAve15	SD_Jet30U_Quad_Fwd	SD_Jet50U	CS_DiJetAve30	SD_MET	SD_BTag_HSCP	SD_L1MuOpen	SD_L1Mu	PD_Mu → HLT_Mu3	PD_Mu → HLT_Mu5	SD_Mu3	SD_Mu9	SD_L1_L2_Mu	SD_DoubleMu	SD_L1SingleEG5	SD_L1DoubleEG5	SD_Photon10_L1R	SD_Ele10_LW_EleId_L1R	SD_Ele15_LW_L1R	SD_Photon15	SD_Photon20	SD_DoubleEG5	SD_DoublePhoton5_JPsi_Upsilon	SD_DoublePhoton10	SD_SingleLooseTau25	SD_DoubleLooseTau15	SD_ZeroBias	SD_MinBiasCal	SD_MinBiasPixel	SD_BH_Forward	TOT

Legend: a "1" in the cell of X label SD_L1Mu and Y label /MinBias indicates that the sample /MinBias will be used to populate the SD_L1Mu. The rightmost yellow columns shows how many time we will have to run on a sample, the orange line indicates how many samples populate an SD (signals excluded).

Note that wrt previous presentations we added 5 highPt lepton/dilepton samples to the Ele and Mu SDs. These will available with an equivalent integrated lumi of O(10)pb-1

Roberto Rossin – Wed. Plenary meeting Oct. 23
http://indico.cern.ch/conferenceDisplay.py?confId=68686

Plugging in the numbers with a step in energy

Month	OP scenario	Max number bunch	Protons per bunch	Min beta*	Peak Lumi	Integrated	% nominal
1	Beam commissioning						
2	Pilot physics combined with commissioning	43	3×10^{10}	4	8.6×10^{29}	~200 nb^{-1}	
3		43	5×10^{10}	4	2.4×10^{30}	~1 pb^{-1}	
4		156	5×10^{10}	2	1.7×10^{31}	~9 pb^{-1}	2.5
5a	No crossing angle	156	7×10^{10}	2	3.4×10^{31}	~18 pb^{-1}	3.4
5b	No crossing angle – pushing bunch intensity	156	1×10^{11}	2	6.9×10^{31}	~36 pb^{-1}	4.8
6	Shift to higher energy: approx 4 weeks	Would aim for physics without crossing angle in the first instance with a gentle ramp back up in intensity					
7	4 – 5 TeV (5 TeV luminosity numbers quoted)	156	7×10^{10}	2	4.9×10^{31}	~26 pb^{-1}	3.4
8	50 ns – nominal Xing angle	144	7×10^{10}	2	4.4×10^{31}	~23 pb^{-1}	3.1
9	50 ns	288	7×10^{10}	2	8.8×10^{31}	~46 pb^{-1}	6.2
10	50 ns	432	7×10^{10}	2	1.3×10^{32}	~69 pb^{-1}	9.4
11	50 ns	432	9×10^{10}	2	2.1×10^{32}	~110 pb^{-1}	12

OCT X SD's pertain to earliest data

Candidate Menu for First Collisions

From /online/cosmic/week44/CMSSW_3_3_0/override/HLT/V1

L3 paths

HLT_BTagIP_Jet50U
HLT_BTagMu_Jet10U
HLT_DoubleEle5_SW_L1R
HLT_DoubleMu0
HLT_DoubleMu3
HLT_Ele10_LW_L1R
HLT_Ele10_LW_EleId_L1R
HLT_Ele15_SC10_LW_L1R
HLT_Ele15_LW_L1R
HLT_Ele15_SiStrip_L1R
HLT_Ele20_LW_L1R
HLT_IsoMu3
HLT_Mu3
HLT_Mu5
HLT_Mu9
HLT_IsoTrack_8E29
HLT_Photon15_TrackIso_L1R
HLT_TkMu3_NoVertex

HLT_L1Jet6U
HLT_Jet15U
HLT_Jet30U
HLT_Jet50U
HLT_FwdJet20U
HLT_DiJetAve15U_8E29
HLT_DiJetAve30U_8E29
HLT_QuadJet15U
HLT_L1MET20
HLT_MET45
HLT_MET100
HLT_HT100U
HLT_L1MuOpen
HLT_L1Mu
HLT_L1Mu20
HLT_L2Mu9
HLT_L2Mu11
HLT_L1DoubleMuOpen
HLT_L1SingleEG5
HLT_L1SingleEG8
HLT_L1DoubleEG5
HLT_DoublePhoton5_eeRes_L1R
HLT_DoublePhoton5_Jpsi_L1R
HLT_DoublePhoton5_Upsilon_L1R

L1 and L2 paths

HLT_Photon10_L1R
HLT_Photon15_L1R
HLT_Photon15_LooseEcalIso_L1R
HLT_Photon20_L1R
HLT_Photon30_L1R_8E29
HLT_DoublePhoton10_L1R
HLT_SingleLooseIsoTau20
HLT_DoubleLooseIsoTau15
HLT_StoppedHSCP_8E29
HLT_L1Mu14_L1SingleEG10
HLT_L1Mu14_L1SingleJet6U
HLT_L1Mu14_L1ETM30
HLT_ZeroBias
HLT_ZeroBiasPrescaled
HLT_MinBias
HLT_MinBiasPixel
HLT_MinBiasPixel_Trk5
HLT_MinBiasHcal
HLT_MinBiasEcal
HLT_CSCBeamHalo
HLT_CSCBeamHaloOverlapRing1
HLT_CSCBeamHaloOverlapRing2
HLT_CSCBeamHaloRing2or3
HLT_BackwardBSC
HLT_ForwardBSC

HLT_HcalPhiSym
HLT_HcalNZS_8E29
AlCa_EcalPhiSym
AlCa_EcalPio_8E29
AlCa_EcalEta_8E29
AlCa_RPCMuonNoHits
AlCa_RPCMuonNormalisation
AlCa_DTErrors
HLT_Calibration
HLT_EcalCalibration
HLT_HcalCalibration
HLT_Random
HLT_Physics
HLT_PhysicsNoMuon
HLT_PhysicsNoMuonPrescaled
HLT_PixelFEDSize
HLT_HFThreshold
HLT_GlobalRunHPDNoise
HLT_TechTrigHCALNoise
HLT_L1_BPTX
HLT_L1_BSC
HLT_L1_HFtech
HLT_L2Muo_NoVertex
HLT_EgammaSuperClusterOnly_L1R
HLTriggerFinalPath

L3 paths prescaled away in /user/apana/332_noL3/CosmicWeek44/override/V4
Need to check CPU performance of HLT_L2Muo_NoVertex before deployment