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HLT Paths included

The summary of HLT paths is shown below. The table is copied from AN-12-140, the polarization analysis. Since we follow their analysis for efficiencies and acceptance, we must duplicate these triggers exactly. The filters are shown for running studies of the rho factor, which is documented elsewhere.

In the HLT path of the table, a link to wbm details of a few triggers is included, which can be used for accessing additional information. Instructions for accessing all this information are listed below.

Trigger Menu	HLT Path	Filter	Run Range
1E33	HLT_Dimuon5_Barrel_Upsilon_v1,v2	hltVertexmumuFilterDimuon5UpsilonBarrelV1,2	165088-167046
1.4E33	HLT_Dimuon5_Barrel_Upsilon_v3	hltVertexmumuFilterDimuon5UpsilonBarrelV3	167078-167913
2E33	HLT_Dimuon5_Barrel_Upsilon_v5	hltVertexmumuFilterDimuon5UpsilonBarrelV5	170722-173198
3E33	HLT_Dimuon7_Upsilon_Barrel_v1	hltVertexmumuFilterDimuon7UpsilonBarrelV1	173236-178380
3E33	HLT_Dimuon9_Upsilon_Barrel_v1	hltVertexmumuFilterDimuon9UpsilonBarrelV1	173236-178380
5E33	HLT_Dimuon7_Upsilon_Barrel_v4	hltVertexmumuFilterDimuon7UpsilonBarrelV4	178420-179889
5E33	HLT_Dimuon9_Upsilon_Barrel_v4	hltVertexmumuFilterDimuon9UpsilonBarrelV4	178420-179889
Total			

HLT Labels

HLT Details

The most accessible (but somewhat inefficient) way I have found to get HLT info is to use WBM and enter a run number range. Once you get the list of runs, click on a run. This takes you to a detailed page, and then use that to navigate to the HLT summary for the run.

```

version4
Module: hltBarrelDimuon7UpsilonL3Filtered
{
  bool CutCowboys = 1
  bool saveTags = 1
  int32 ChargeOpt = -1
  double MaxRapidityPair = 1.25
  double MaxDCAMuMu = .5
  double MaxAcop = 999
  double MinAcop = -999
  double MaxInvMass = 11.5
  double MinInvMass = 8.5
  double MinPtMin = 0
  double MinPtMax = 0
  double MinPtPair = 6.9
  InputTag PreviousCandTag = hltDimuonL2PreFiltered0
  InputTag BeamSpotTag = hltOnlineBeamSpot
}

Module: hltDimuon9BarrelUpsilonL3Filtered
{
  bool CutCowboys = 1
  bool saveTags = 1
  int32 ChargeOpt = -1
  double MaxRapidityPair = 1.25
  double MaxDCAMuMu = .5
  double MaxAcop = 999
  double MinAcop = -999
  double MaxInvMass = 11.5

```

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```
double MinInvMass = 8.5
double MinPtMin = 0
double MinPtMax = 0
double MinPtPair = 8.9
InputTag PreviousCandTag = hltDimuonL2PreFiltered0
InputTag BeamSpotTag = hltOnlineBeamSpot
}
```

HLT_Dimuon5_Upsilon_Barrel_v5 Module: hltBarrelUpsilonL3Filtered

```
{
  bool CutCowboys = 1
  bool saveTags = 1
  int32 ChargeOpt = -1
  double MaxRapidityPair = 1.25
  double MaxDCAMuMu = .5
  double MaxAcop = 999
  double MinAcop = -999
  double MaxInvMass = 11.5
  double MinInvMass = 8.5
  double MinPtMin = 0
  double MinPtMax = 0
  double MinPtPair = 4.9
  InputTag PreviousCandTag = hltDimuonL2PreFiltered0
  InputTag BeamSpotTag = hltOnlineBeamSpot
}
```

Module: hltVertexmumuFilterUpsilonBarrel

```
{
  bool saveTags = 1
  bool FastAccept = 1
  double MinCosinePointingAngle = -2
  double MinVtxProbability = .005
  double MaxNormalisedChi2 = 999999
  double MinLxySignificance = 0
  InputTag MuonTag = hltL3MuonCandidates
  InputTag BeamSpotTag = hltOnlineBeamSpot
  InputTag DisplacedVertexTag = hltDisplacedmumuVtxProducerUpsilonBarrel
}
```

----++

What does a Dimuon_Upsilon trigger that is NOT a barrel trigger look like? There does not seem to be a cowboy veto. See [HLT_Dimuon0_Upsilon_Muonv7](#):

```
Module: hltUpsilonMuonL3Filtered
{
  bool saveTags = 1
  int32 ChargeOpt = -1
  double MaxRapidityPair = 2.5
  double MaxDCAMuMu = .5
  double MaxAcop = 999
  double MinAcop = -999
  double MaxInvMass = 11.5
  double MinInvMass = 8.5
  double MinPtMin = 0
  double MinPtMax = 0
  InputTag PreviousCandTag = hltTripleMuonL2PreFiltered0
  InputTag BeamSpotTag = hltOnlineBeamSpot
}
```

Single muon triggers are also of interest for studying the R factor in data. See for instance [HLT_Mu24_v2](#).

```
module *hltSingleMu24L3Filtered24* = {
```

```

InputTag BeamSpotTag = hltOnlineBeamSpot
InputTag CandTag = hltL3MuonCandidates
InputTag PreviousCandTag = hltL2Mu12L2Filtered12
int32 MinN = 1
double MaxEta = 2.5
int32 MinNhits = 0
double MaxDr = 2.0
double MaxDz = 9999.0
double MinPt = 24.0
double NSigmaPt = 0.0
untracked bool SaveTag = true
}

```

HLT Browser

The HLT browser [is](#) a helpful way of determining trigger path names and the sequence of filters applied for each path. To find trigger information, select the year, trigger menu, and version (for example 2011/e33/v2). Then go to stream A, find the class of trigger that interests you (for instance MuOnia) then select the trigger you want. This will bring up a list of details for the sequence of that trigger.

The screenshot shows the HLT Browser interface for the configuration `/online/collisions/2011/1e33/v2.0/HLT/V7`. The left sidebar shows a tree view of trigger menus and versions. The main panel displays a table of trigger paths under 'Stream A' with their corresponding prescaler values for various streams.

Stream	Primary Dataset	HLT path	2e33	1.4e33	1e33	7e32	5e32	3e32	2e32	1.4e32
▼ A		▶ BTag								
		▶ Commissioning								
		▶ Cosmics								
		▶ DoubleElectron								
		▶ DoubleMu								
		▶ ElectronHad								
		▶ HT								
		▶ HcalHPDNoise								
		▶ HcalNZS								
		▶ Jet								
		▶ MET								
		▶ MinimumBias								
		▶ MuEG								
		▶ MuHad								
		▼ MuOnia								
		HLT_Dimuon0_Jpsi_Muon_v1	1	1	1	1	1	1	1	1
		HLT_Dimuon0_Jpsi_v1	40	30	20	14	10	6	4	4
		HLT_Dimuon0_Upsilon_Muon_v1	1	1	1	1	1	1	1	1

The attached text file shows the sequence for each trigger used in the analysis.

Sequences

Some sample path sequences are listed here:

path **HLT_Mu24_v2** = HLTBeginSequenceBPTX [+](#) hltL1sL1SingleMu12 [+](#) hltPreMu24 [+](#) hltL1SingleMu12L1Filtered0 [+](#) HLTL2muonrecoSequence [+](#) hltL2Mu12L2Filtered12 [+](#) HLTL3muonrecoSequence [+](#) hltSingleMu24L3Filtered24 [+](#) HLTEndSequence [+](#)

path **HLT_Dimuon0_Barrel_Upsilon_v1** = HLTBeginSequenceBPTX [+](#) hltL1sL1DoubleMu0 [+](#) hltPreDimuon0BarrelUpsilon [+](#) hltDimuonL1Filtered0 [+](#) HLTL2muonrecoSequence [+](#) hltDimuonL2PreFiltered0 [+](#) HLTL3muonrecoSequence [+](#) hltDimuonL3PreFiltered0Upsilon [+](#) hltDimuon0BarrelUpsilonL3Filtered [+](#) HLTEndSequence [+](#)

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