TWiki > AtlasProtected Web > HeavyQuarkDMRun2 > ObjectSelection
(2015-02-09, PriscillaPani)

Objects Selection

Please, use following version of AnalysisBase :

```
/cvmfs/atlas.cern.ch/repo/sw/ASG/AnalysisBase/2.0.18
```

together with the following tools:

- EventLoop
- xAODEventInfo
- xAODRootAccess
- GoodRunsLists
- xAODJet
- JetSelectorTools
- JetResolution
- BCHCleaningTool
- JetCalibrationTool
- JESUncertaintyProvider
- JVFUncertaintyTool
- CalibrationDataInterface
- xAODBTaggingEfficiency
- METUtilities
- xAODMuon
- MuonMomentumCorrections
- MuonEfficiencyCorrections
- PileupReweighting
- xAODEgamma
- ElectronPhotonFourMomentumCorrection
- ElectronPhotonSelectorTools
- ElectronEfficiencyCorrection

Muon selection

Combined Muons "CB" are used in the analysis.

CB muons

Cut number	Cut description	Cut details
Ms 0	Initial muons	Apply pT smearing
Ms 1	author/isCombined	CB muons: (author==6) AND isStandaloneMuon==0
Ms 2	Tightness	tight
Ms 3	eta requirement	CB muons |η|<2.5
Ms 4	pT requirement	pT>2.5GeV
Ms 5	B layer	NOT expectBLayerHit OR nBLHits>0
Ms 6	Pixel hits	nPixHits+nPixelDeadSensors>0
Ms 7	SCT hits	nSCTHits+nSCTDeadSensors>4
Ms 8	Holes	nPixHoles+nSCTHoles<3
Ms 9	TRT outliers	N=nTRTOutliers+nTRTHits
		if 0.1<|η|<1.9: require N>5 AND nTRTOutliers<0.9N
		if |η|<=0.1 or |η|>=1.9: if N>5 require nTRTOutliers<0.9N
		See the example code below
Ms 10	Muon Spectrometer hit requirements	nCSCEtaHits+nCSCPhiHits>0 AND nMDTEMHits>0 AND nMDTEOHits>0 (apply only to Standalone muons)
Ms 11	Cosmic cut (d0 requirement)	abs(mu_*_trackd0pv)<1mm (NOT for Standalone muons) (after d0 smearing is applied)
Ms 12	z0 requirement	abs(mu_*_trackIPEstimate_z0_unbiasedpv)<10mm (NOT for Standalone muons)
Ms 13	Track isolation	to be defined
Ms 15	Calorimeter isolation	to be defined
Ms 16	Impact parameter significance	to be defined

TRT cut example code

```
def trtHitCut_2012(eta, hits, outliers):
    '''True means this muon should pass this cut'''
    N = outliers + hits
    N_O = outliers
    if abs(eta) > 0.1 and abs(eta) < 1.9:
        if N > 5 and N_O < 0.9*N:
            return True
    elif abs(eta) <= 0.1 or abs(eta) >= 1.9:
        if N > 5:
            if N_O < 0.9*N:
                return True
        else:
           return True
    return False
```

Electron selection

Cut number	Cut description	Cut details
El 0	Initial electrons	Apply smearing/energy corrections
El 1	author	1 OR 3
El 2	ET requirement	ET>2.5GeV
El 3	eta range	abs(cl_eta)<2.47
El 5	z0 requirement	abs(trackz0pv)<10mm
El 8	Track isolation	to be defined
El 9	Calorimeter isolation	to be defined
El 10	Impact parameter significance	`abs(el_trackd0pv)/el_tracksigd0pv<6.5`

MET and MET Cleaning

Use tool :

* METUtilities

Jets

Definition of good jet :

- |eta|<4.5
- pt>25 GeV
- Use JetSelectorTools to clean up Jets.
- Additional corrections: JetResolution, BCHCleaningTool, JetCalibrationTool, JESUncertaintyProvider, JVFUncertaintyTool, CalibrationDataInterface and xAODBTaggingEfficiency

Event selection

ttbar final state

Cut number	Cut description	Cut details
Ev 0	Initial events	Apply MC, pileup and z vertex reweighting
Preselection		
Ev 1	GRL	data12_8TeV.periodAllYear_DetStatus-v61-pro14-02_DQDefects-00-01-00_PHYS_StandardGRL_All_Good.xml https://atlasdqm.web.cern.ch/atlasdqm/grlgen/All_Good/
		L = 20690.4 pb-1
Ev 2	Reject bad events (data only)	
Ev 3	Trigger	EF_5j55_a4tchad_L2FS or EF_b45_medium_4j45_at4chad
Ev 4	Apply Primary vertex cut	vxp_nTracks[0]>4
Ev 5	Lepton Veto	Exactly 0 good muons (pT > 25 GeV, medium)
Ev 6	Lepton Veto	we require exactly 0 electrons (pT > 25 GeV, |η| < 2.47)
Ev 7	Jet cleaning	Reject the event if a BadLooseMinus jet is present
Ev 8	Jet Multiplicity	At least 5 jets present in the event (pT > 25 GeV, |η|<2.5)
Ev 9	b-tagging	At least two b-tagged jets in the event (MV1, 70% WP)
Ev 10	Razor cut	require Razor R>0.75
Ev 11	Required dPhi(b,MET)	|dPhi(b,MET)|>0.8
Ev 12	MET cut	MET>100 GeV

b-jets final states

Cut number	Cut description	Cut details
Ev 0	Initial events	Apply MC, pileup and z vertex reweighting
Preselection		
Ev 1	GRL	data12_8TeV.periodAllYear_DetStatus-v61-pro14-02_DQDefects-00-01-00_PHYS_StandardGRL_All_Good.xml https://atlasdqm.web.cern.ch/atlasdqm/grlgen/All_Good/
		L = 20690.4 pb-1
Ev 2	Reject bad events (data only)	
Ev 3	Trigger	EF_xe80_tclcw (if MET), EF_mu24i_tight or EF_mu36_tight (if Muon), EF_e24vhi_medium1 or EF_e60_medium1 (if Electron)
Ev 4	Apply Primary vertex cut	Vertex (at least 2 tracks)
Ev 5	MET cut	MET > 350 GeV
Ev 6	Lepton Veto Muons	we require exactly 0 muons (pT > 25 GeV, |η| < 2.5)
Ev 6	Lepton Veto Electrons	we require exactly 0 electrons (pT > 25 GeV, |η| < 2.47)
Ev 7	Leading Jet	pT > 100 GeV and |η|<2.5)
Ev 8	Additional Jet	pT > 50 GeV and |η|<2.5)
Ev 9	b-tagging	on leading Jet: flavor_weight_MV1
Ev 10	DeltaPhi cut	| dPhi(MET, additionalJet)| > 0.4

1-Lepton final states

Cut number	Cut description	Cut details
Ev 0	Initial events	Apply MC, pileup and z vertex reweighting
Preselection		
Ev 1	GRL	data12_8TeV.periodAllYear_DetStatus-v61-pro14-02_DQDefects-00-01-00_PHYS_StandardGRL_All_Good.xml https://atlasdqm.web.cern.ch/atlasdqm/grlgen/All_Good/
		L = 20690.4 pb-1
Ev 2	Reject bad events (data only)	
Ev 3	Trigger	EF_xe80_tclcw (if MET), EF_mu24i_tight or EF_mu36_tight (if Muon), EF_e24vhi_medium1 or EF_e60_medium1 (if Electron)
Ev 4	Apply Primary vertex cut	Vertex (at least 4 tracks)
Ev 5	Lepton Selection	Exactly 1 isolated lepton (electron or muon)
Ev 6	Lepton pT	pT > 25 GeV, |η| < 2.47
Ev 7	jet requirements	at least 4 jets (pT > 80-70-50-25)
Ev 8	b-jets requirement	at least 1 b-jet (MV1@70%) pT > 60 GeV
Ev 9	METt Cut	> 270 GeV
Ev 10	three jet inv. mass	< 360 GeV
Ev 11	dPhi(jet1 or jet2,MET)	> 0.6
Ev 12	dPhi(lep,MET)	>0.6
Ev 13	dR(lep,j1)	< 2.75
Ev 14	dR(lep,bjet)	< 3
Ev 15	topness	>2
Ev 16	aMT2	> 190 GeV
Ev 17	mT lep	> 130 GeV
Ev 18	MET significance	9

Major updates:
-- PriscillaPani - 2015-02-09

Responsible: HensoAbreu
Last reviewed by: **Never reviewed**

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