

Run SingleE Run2016 (2017, 2018), Trigger HLT_Ele(27,32or35)_WPtight24

$N(\mu) = 0$	$(p_T > 15 \text{ GeV})$	
Ele	$N(e)$	= 1
	$p_T(e)$	$> 35(55) \text{ GeV}$
	$ \eta(e) $	< 2.1
	Relative Isolation	< 0.15
Tau	$N(\tau_h)$	= 1
	$p_T(\tau_h)$	$> 20 \text{ GeV}$
	$ \eta(\tau_h) $	< 2.1
	Isolation	Tight
	Prongs	1 or 3 hp
$e - \tau$ pair	$Q(e)Q(\tau)$	< 0 (OS)
	$\Delta R(e, \tau_h)$	> 0.5
	$N(e, \tau_h)$ pairs	= 1
	$\cos \Delta\phi(e, \tau_h)$	< -0.98
	$m_T(p_T^{\text{lead-}\ell}, E_T^{\text{miss}})$	$> 150 \text{ GeV}$
leading lepton	$ \cos \Delta\phi(p_T^{\text{lead-}\ell}, E_T^{\text{miss}}) $	> 0.95

CR-DY	CR- $t\bar{t}$
$m_T(p_T^{\text{lead-}\ell}, E_T^{\text{miss}}) < 150 \text{ GeV}$	$N(b\text{-jets}) \geq 1$
$60 < m_{\text{rec}}(e, \tau_h, \Delta p_T) < 120 \text{ GeV}$	

$*(p_T > 30 \text{ GeV} \& \text{ CSV medium})$

CUTS

```
***NRecoVertex      1  -1  //at least one good vertex
***NRecoTriggers1   1  -1  //events must fire the HLT_IsoMu24 trigger
***NRecoMuon1       0   0
***NRecoElectron1   1   1
NRecoElectron2      0  -1
***NRecoTau1         1   1
NRecoTau2            0  -1
***NRecoBJet         1  -1
***NElectron1Tau1Combinations 1   1
***NDiJetCombinations 0   0
```

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```

SmearTheParticle 0
PtScaleOffset 1.
PtSigmaOffset 1.
EtaScaleOffset 1.
EtaSigmaOffset 1.
PhiScaleOffset 1.
PhiSigmaOffset 1.
EnergyScaleOffset 1.
EnergySigmaOffset 1.

MatchToGen 0
GenMatchingDeltaR 0.1
UseMotherID 1
MotherID 23.
doEfficiencyPlots false
///////////////////////////////
Elec1
/////////////////////////////
//---RECO CUTS---///

EtaCut 2.1
PtCut 35.0 9999.9

DoDiscrByIsolation 0
IsoSumPtCutValue 0.0 0.15

//(0:fail, 1:veto, 2:loose, 3:medium, 4:tight)
DoDiscrByCBID false
DiscrByCBID 4

DoDiscrBymvaID true
DiscrBymvaWP80 0
DiscrBymvaWP90 1
DiscrBymvaWPL 0

DoDiscrByHEEPID false

//---MET TOPOLOGY CUTS---///

DiscrIfIsZdecay 0

DiscrByMetDphi 0
MetDphiCut 1.70 3.15

DiscrByMetMt 0
MetMtCut 0. 40.

```

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	$ \eta(e) < 2.1$
	Relative Isolation < 0.15
Tau	$N(\tau_h) = 1$
	$p_T(\tau_h) > 20 \text{ GeV}$
	$ \eta(\tau_h) < 2.1$
	Isolation Tight
$e - \tau$ pair	Prongs 1 or 3 hp
	$Q(e)Q(\tau) < 0 \text{ (OS)}$
	$\Delta R(e, \tau_h) > 0.5$
	$N(e, \tau_h) \text{ pairs} = 1$
	$\cos \Delta\phi(e, \tau_h) < -0.98$
leading lepton	$m_T(p_T^{\text{lead-}\ell}, E_T^{\text{miss}}) > 150 \text{ GeV}$
	$ \cos \Delta\phi(p_T^{\text{lead-}\ell}, E_T^{\text{miss}}) > 0.95$

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```
#####
# Electron1Tau1
#####

DiscrByDeltaR 1
DeltaRCut 0.3
DiscrByOSLSType OS
DiscrByCosDphi 1 # dPhi is calculated between Electron1 and Tau1
CosDphiCut -1.00 -0.98

DiscrByCosDphi_DeltaPtAndMet false
CosDphi_DeltaPtMetCut 0.8 1.0
DiscrByMassReco false
HowCalculateMassReco None ###VectorSumOfVisProductsAndMet or CollinearApprox
MassCut 0.0 200.0
DiscrByCDFzeta2D 0
PZetaCutCoefficient 1.0
PZetaVisCutCoefficient -3.1
CDFzeta2DCutValue -50.0 1000
DiscrByDeltaPtDivSumPt 0
DeltaPtDivSumPtCutValue 0.1 1.0
DiscrByDeltaPt 0
DeltaPtCutValue 30.0 1000.0
DiscrByCosDphiPtAndMet 0 # dPhi between Electron1 and MET
CosDphiPtAndMetCut -1.00 -0.90

# dPhi between leading lepton in the combination and MET
DiscrByCosDphiLeadPtAndMet 1
CosDphiLeadPtAndMetCut -1.00 -0.95
DiscrByAbsCosDphiLeadPtandMet 0
AbsCosDphiLeadPtAndMetCut 0.90 1.00
DiscrByMtLeadPtAndMet 1
MtLeadPtAndMetCut 150.0 9999.0

DiscrByDiLepMassDeltaPt 0
DiLeadMassDeltaPtCut 0.0 9000.0
```

```
#####
# Jet1
#####
EtaCut 0. 5.0
PtCut 30.0

ApplyLooseID 1
ApplyTightID 0

ApplyPileupJetID 0
# WPs: tight = 0, medium = 1, loose = 2
PUJetIDCut 0
FailPUJetID 0

RemoveOverlapWithMuon1s 0
RemoveOverlapWithMuon2s 0
Muon1MatchingDeltaR 0.4
Muon2MatchingDeltaR 0.4

RemoveOverlapWithElectron1s 1
RemoveOverlapWithElectron2s 0
Electron1MatchingDeltaR 0.3
Electron2MatchingDeltaR 0.3

RemoveOverlapWithTau1s 1
RemoveOverlapWithTau2s 0
Tau1MatchingDeltaR 0.4
Tau2MatchingDeltaR 0.4

RemoveOverlapWithJs 1
JMatchingDeltaR 0.8

RemoveOverlapWithBs 1
BJMatchingDeltaR 0.3

Apply2017EEnoiseVeto false

DiscrByDPhiMet 0
DPhiMetCut 0.5 999.9
```

```
#####
# BJet
#####
EtaCut 0.0 2.4
PtCut 30.0

RemoveOverlapWithMuon1s 0
RemoveOverlapWithMuon2s 0
Muon1MatchingDeltaR 0.4
Muon2MatchingDeltaR 0.3

RemoveOverlapWithElectron1s 1
RemoveOverlapWithElectron2s 0
Electron1MatchingDeltaR 0.3
Electron2MatchingDeltaR 0.3

RemoveOverlapWithTau1s 1
RemoveOverlapWithTau2s 0
Tau1MatchingDeltaR 0.4
Tau2MatchingDeltaR 0.4

Apply2017EEnoiseVeto false

#####
### 2016 CVS : loose = 0.5426, medium = 0.8484, tight = 0.9535
##### 2017 DeepCSV : loose = 0.0521, medium = 0.3033, tight = 0.7489
##### 2018 DeepF : loose = 0.0494, medium = 0.2770, tight = 0.7264
#####

ApplyJetBTaggingCSVv2 1
ApplyJetBTaggingDeepCSV 0
ApplyJetBTaggingDeepFlav 0

JetBTaggingWP medium
JetBTaggingCut 0.8484
MatchBToGen 0
UseBtagSF 1
RemoveBJetsFromJets 0
```

```
//////////  
TauID  
/////////  
  
# Options for TauIDAlgorithm: Tau_idMVAoldDM2017v2 or Tau_idDeepTau2017v2p1  
TauIDAlgorithm Tau_idDeepTau2017v2p1  
  
//////////  
Tau1  
/////////  
  
//RECO CUTS//  
  
EtaCut 2.1  
PtCut 20.0 9999.9  
  
DoDzCut true  
DzCutThreshold 0.2  
  
DoDiscrByLeadTrack false  
LeadTrackThreshold 5.0  
  
DoDiscrByIsolation true  
// MVA: 1 = VVLoose, 2 = VLoose, 4 = Loose, 8 = Medium,  
// 16 = Tight, 32 = VTight, 64 = VVTight  
// DeepTau: 1 = VVVLoose, 2 = VVLoose, 4 = VLoose,  
// 8 = Loose, 16 = Medium, 32 = Tight, 64 = VTight, 128 = VVTight  
DiscrByMinIsolation 32  
DiscrByMaxIsolation 32  
FlipIsolationRequirement false  
DiscrByProngType true  
ProngType 1or3hps  
decayModeFindingNewDMs true  
decayModeFinding false  
  
DoDiscrAgainstElectron true  
// MVA: 1 = VLoose, 2 = Loose, 4 = Medium, 8 = Tight, 16 = VTight  
// DeepTau: 1 = VVVLoose, 2 = VVLoose, 4 = VLoose,  
// 8 = Loose, 16 = Medium, 32 = Tight, 64 = VTight, 128 = VVTight  
DiscrAgainstElectron 16  
SelectTausThatAreElectrons false  
  
DoDiscrAgainstMuon true  
// MVA: 1 = Loose, 2 = Tight  
// DeepTau: 1 = VLoose, 2 = Loose, 4 = Medium, 8 = Tight  
DiscrAgainstMuon 8  
SelectTausThatAreMuons false  
  
DoDiscrByCrackCut false  
  
RemoveOverlapWithMuon1s false  
RemoveOverlapWithMuon2s false  
Muon1MatchingDeltaR 0.3  
Muon2MatchingDeltaR 0.3  
  
RemoveOverlapWithElectron1s true  
RemoveOverlapWithElectron2s true  
Electron1MatchingDeltaR 0.3  
Electron2MatchingDeltaR 0.3  
  
//---MET TOPOLOGY CUTS---//  
  
DiscrByMetDphi false  
MetDphiCut 1.3 3.15  
  
DiscrByMetMt false  
MetMtCut 0.0 50.0
```

```
CalculatePUSystematics false
DataHistos PileUpReweighting2016.root
MCHistos mc2016_pileup_Dec2018reReco.root
DataPUHistName pileup
MCPUHistName pileup

SpecialMCPUCalculation false
SpecialMCPUHistos new_mc2017_pileupReweighting_NanoAODv6.root

ApplyTauIDSF false
TauIdSFsByDM false
TauSFforEmbeddedSamples false

ApplyTauAntiEleSF false
ApplyTauAntiMuSF false

isData true
ApplyGenWeight false
UsePileUpWeight false

ApplyISRZBoostSF false
ApplySUSYZBoostSF false
ApplyVBFSusyZBoostSF false

ApplyL1PrefiringWeight false
UseJetEMPt false

/// ----- Data-specific cuts -----///
FilterDataByGoldenJSON true
ApplyHEMVeto2018 false

/// ----- MC Gen-level cuts -----///
/// --- HT filter --- ///
DiscrByGenHT false
LowerGenHtCut 0.0
UpperGenHtCut 100.0

/// --- dilepton mass filter --- ///
DiscrByGenDileptonMass false
GenDilepMassRange 50.0 100.0

/// ----- Triggers ----- ///
Trigger1FirstRequirement HLT_Ele27_WPtight_Gsf
Trigger1SecondRequirement HLT_Ele27_WPtight_Gsf
UseTriggerWildcard true

Trigger2FirstRequirement HLT_Ele27_WPtight_Gsf
Trigger2SecondRequirement HLT_Ele27_WPtight_Gsf

//---Treat Muon as Neutrino---///
TreatMuonsAsNeutrinos 0
TreatOnlyOneMuonAsNeutrino 0
TreatMuonsAsTaus 0

//-----MET cuts-----///
ApplyMetFilters false
MT2Mass 0.
DiscrByMet false
MetCut 250.0 10000.0

DiscrByMHT false
MhtCut 50.0
DiscrByHT false
HtCut 30.0

JetPtForMhtAndHt 30.0
JetEtaForMhtAndHt 5.0

ApplyJetLooseIDforMhtAndHt false
ApplyJetTightIDforMhtAndHt false

/// --- MC selection --- ///
InitializeMCSelection false
```