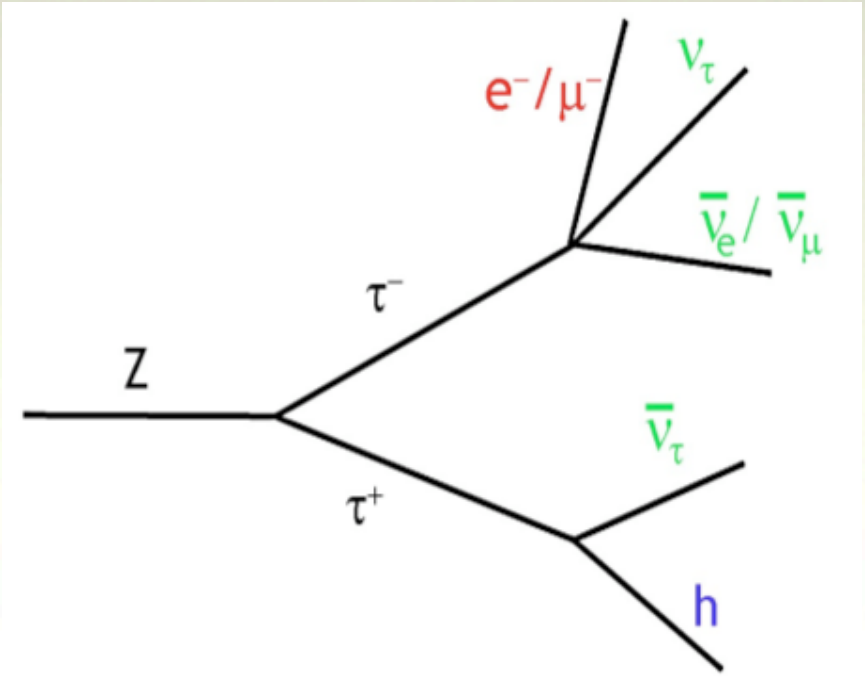
$Z \rightarrow \tau\tau$ analysis status

Outline

- The $Z \rightarrow \tau\tau$ visible mass analysis:
  - Analysis motivation and overview
  - Results for MC analysis at 7 TeV with benchmark selection
- Data/MC comparison for loosened selection

$Z \rightarrow \tau\tau \rightarrow$ lepton τ_{had}

Motivation:
- Control samples for channels containing τ
- Tau-jet scale determination
- Tau-jet ID efficiency determination
- Missing E_T scale determination
- Measurement of the cross section $pp \rightarrow Z \times BR(Z \rightarrow \tau\tau \rightarrow l\tau_{had})$



Signature:
- Lepton
- Tau decaying to hadrons
- Missing E_T due to three neutrinos produced in the tau decays
- Lepton and tau jet with opposite sign
- E_T miss pointing in between the phi-directions of the decay products

$Z \rightarrow \tau\tau$ full visible mass analysis

MC analysis (aimed at a ~ 100 pb^{-1} scenario)

Visible mass analysis:
- Statistic preferred to purity
- No cuts on E_T Miss (the analysis must be done before th E_T Miss scale is set)
- Reconstruct the invariant mass only of the visible decay products (visible mass) → depends on the tau-jet scale and not on the E_T Miss scale

The main motivation for this analysis is the tau-jet scale determination

Analysis performed using a private C++ analysis running on D3PDs validated against the Benchmark ZToTwoTaus Package

Too low statistics for QCD MC samples → Isolation and TauID factorization used

Official MC D3PD samples from:
group10.perf-tau.mc09_7TeV_r1250_fromAOD.00-05-00.tauPerfD3PD/
group10.perf-tau.mc09_7TeV_r1250_fromESD.00-05-00.tauPerfD3PD/

Overview: trigger and lepton selection

Trigger: mu10 or e_10_medium are required.
Slightly different from the Benchmark Analysis: no matching of the lepton to the trigger is required

MUONS

Preselection:

- p_T > 10 GeV
- η < 2.5
- BestMatch
- author == 5 || author == 6
- isCombined
- charge == 1
- match χ^2/ndof < 8

Overlap Removal:

- with overlap removed muons and preselected electrons
- cone 0.2

Selection:

- p_T > 15 GeV
- Isolation:
  - EtCone40/E_T < 0.1
  - NuCone40 = 0
- highets p_T

Against QCD

ELECTRONS

Preselection:

- p_T > 10 GeV
- η < 2.5
- author 1 or 3
- medium ID

Overlap Removal:

- with overlap removed muons and preselected electrons
- cone 0.2

Selection:

- p_T > 15 GeV
- tight ID
- Isolation:
  - EtCone30/E_T < 0.12
  - NuCone40 = 0
- highest p_T

Against QCD

Overview: tau-jet selection

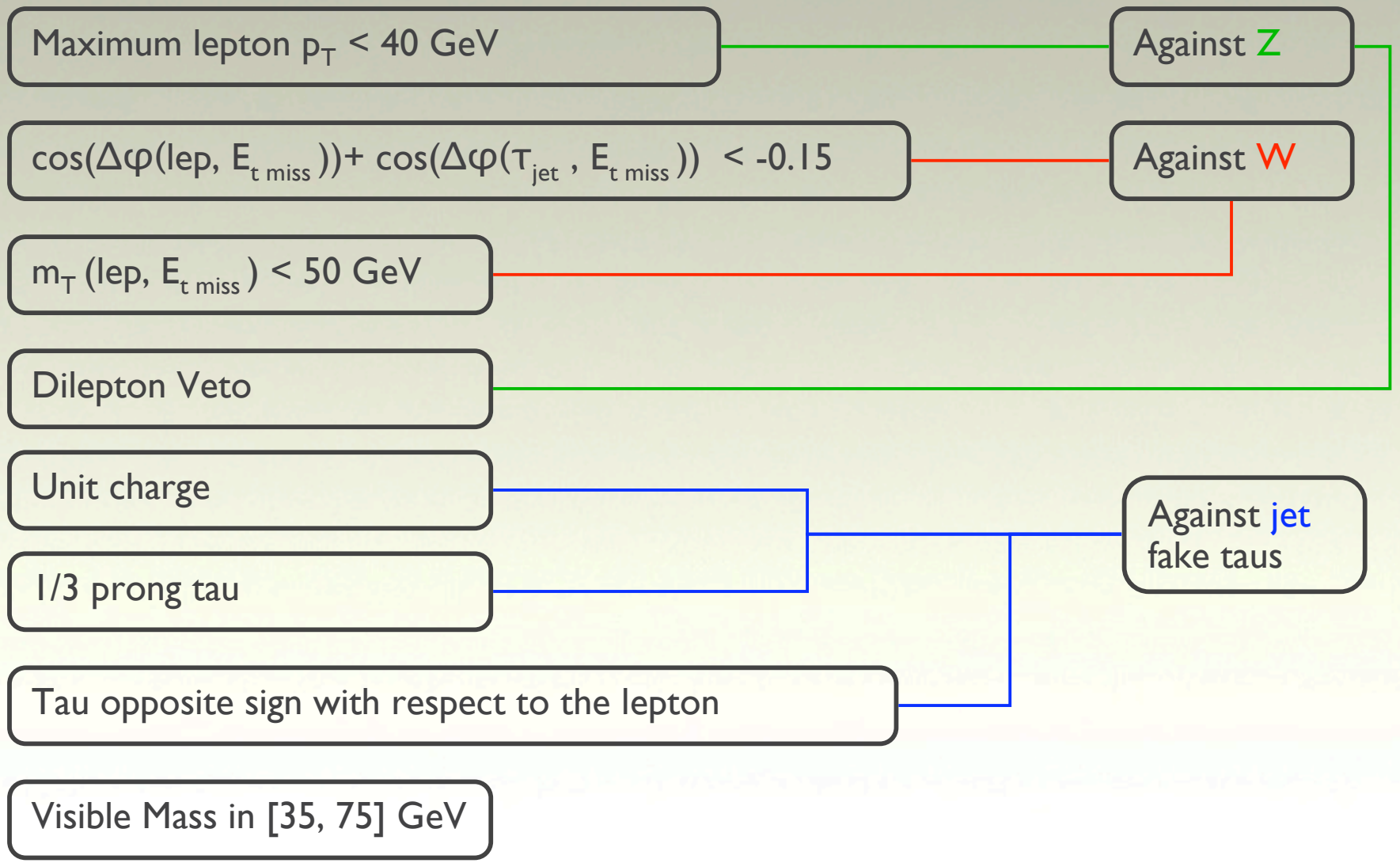
Preselection

- E_T > 15 GeV
- η < 2.5
- electron veto medium == 0
- muon veto == 0
- author == 3 (both calo and track seeded)
- CutSafeTight ID ← Against backgrounds with no taus

Overlap Removal

- with olr muons, olr electrons, preselected taus
- cone 0.4

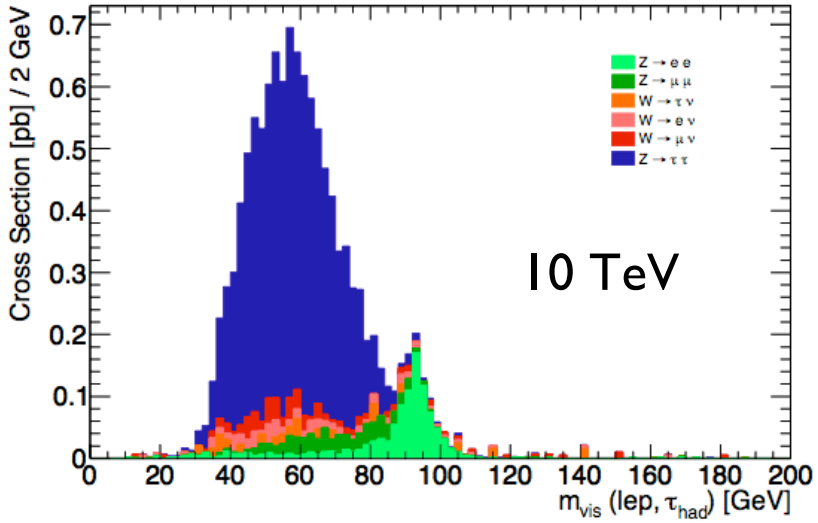
Overview: further cuts

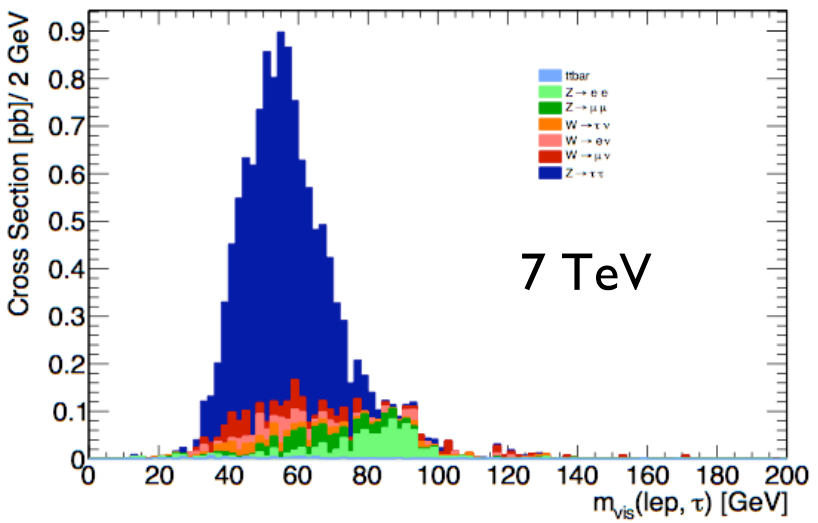


100 pb^{-1} scenario: signal and electroweak backgrounds

Expected at VisMass (VisMass 2), in 100 pb^{-1}: 968 (914) signal events, S/B = 2.95 (4.85)

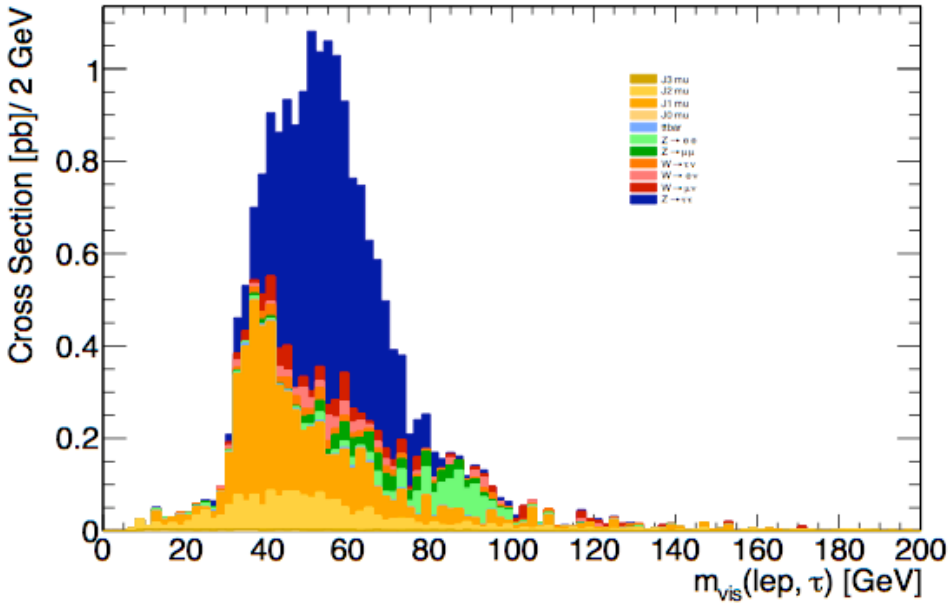
	$Z \to \tau\tau$ at 7 TeV	$W \to e\nu$ at 7 TeV	$W \to \mu\nu$ at 7 TeV	$W \to \tau\nu$ at 7 TeV	$Z \to ee$ at 7 TeV	$Z \to \mu\mu$ at 7 TeV	Drell Yan
Generated	860	7761	7761	2747	826	826	3470
IsTriggered	193	5572	5297	999	715	702	24.6
PassedCleaning	193	5572	5297	999	715	702	24.6
HasLepton	107	3850	4779	562	577	664	5.73
HasIsolatedLepton	89.2	2949	4174	465	478	621	4.62
HasChosenLepton	83.1	2231	3154	442	249	304	4.46
HasTauJet	12.0	16.6	23.0	4.39	3.40	3.00	0.139
SumCosDeltaPhi	11.1	2.52	3.71	1.48	2.48	1.65	0.104
TransMass	10.8	1.67	2.37	1.35	2.30	1.56	0.104
DileptonVeto	10.7	1.67	2.36	1.35	1.51	1.03	0.104
TauJetNumTrack1or3	9.90	0.747	0.994	0.566	1.13	0.77	0.0695
TauJetUnitCharge	9.85	0.739	0.971	0.563	1.06	0.768	0.0695
OppositeSign	9.69	0.49	0.769	0.418	0.913	0.657	0.0347
VisMass	9.68	0.49	0.769	0.418	0.913	0.657	0.0347
VisMass2	9.14	0.358	0.551	0.305	0.234	0.42	0.0174





100 pb^{-1} scenario: QCD muon backgrounds and ttbar

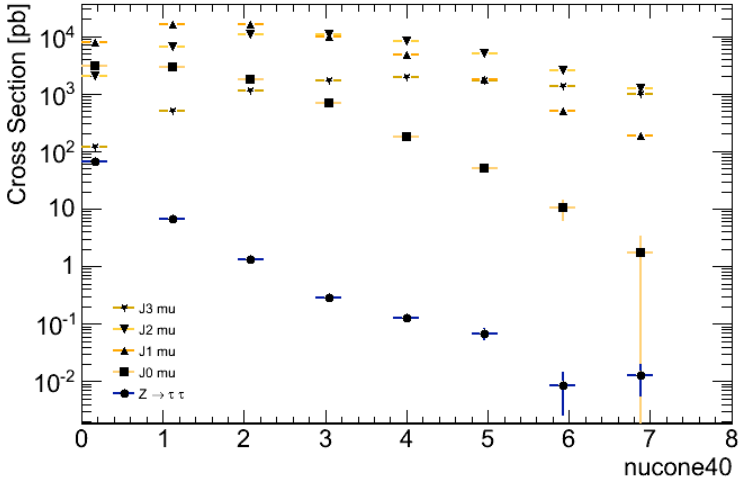
	$Z \to \tau\tau$ at 7 TeV	$t\bar{t}$ at 7 TeV	J0mu at 7 TeV	J1mu at 7 TeV	J2mu at 7 TeV	J3mu at 7 TeV
Generated	860	88.4	824396	826060	219525	28893
IsTriggered	193	58.7	166618	293617	109954	17363
PassedCleaning	193	58.7	166618	293617	109954	17363
HasLepton	107	47.4	7296	48072	40532	9348
HasIsolatedLepton	89.2	33.2	841	2895	582	22.1
HasChosenLepton	83.1	13.2	840	2895	578	20.4
HasTauJet	12.0	0.965	2.09	35.9	13.9	0.664
SumCosDeltaPhi	11.1	0.454	1.31	24.5	9.82	0.491
TransMass	10.8	0.257	1.31	24.5	9.81	0.489
DileptonVeto	10.7	0.211	1.29	24.3	9.60	0.462
TauJetNumTrack1or3	9.90	0.125	0.436	9.45	3.73	0.181
TauJetUnitCharge	9.85	0.123	0.36	8.70	3.40	0.168
OppositeSign	9.69	0.101	0.248	4.51	1.78	0.0915
VisMass	9.68	0.0997	0.248	4.51	1.77	0.0904
VisMass2	9.14	0.0533	0.163	3.29	1.10	0.0382

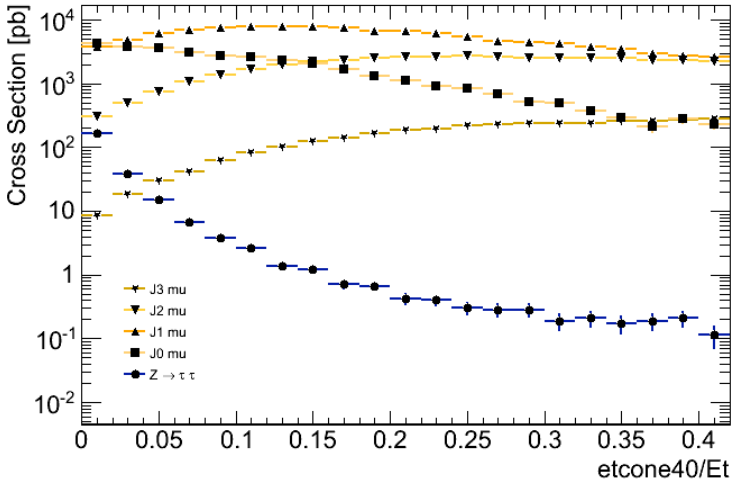


- Background due to Jxmu in the VisMass (VisMass2) window: 68% (50 %) of the signal.
- The main difference wrt 10 TeV comes from isolation
- Problems related to the factorization procedure?

Comparison of muon isolation variables: 10 TeV and 7 TeV

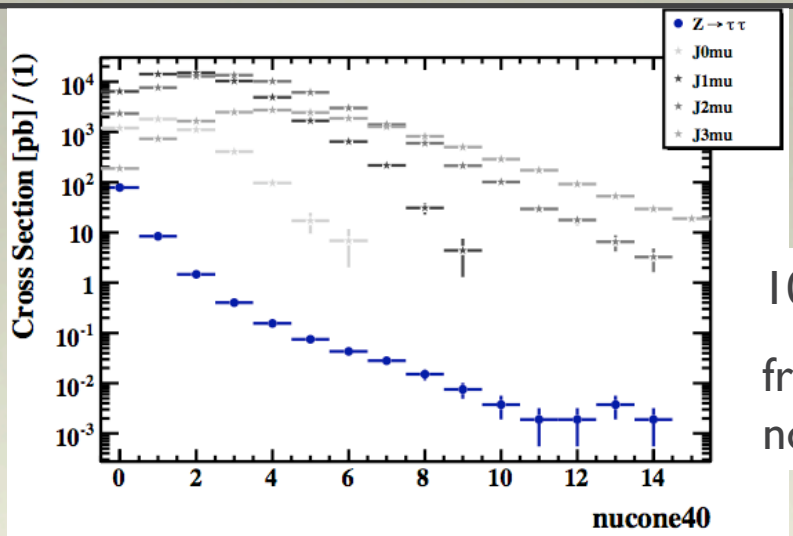
7 TeV

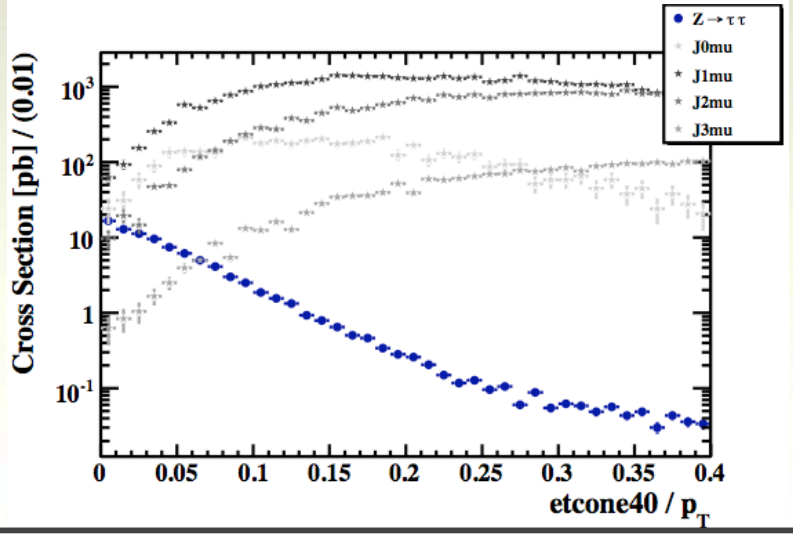




10 TeV

from the note



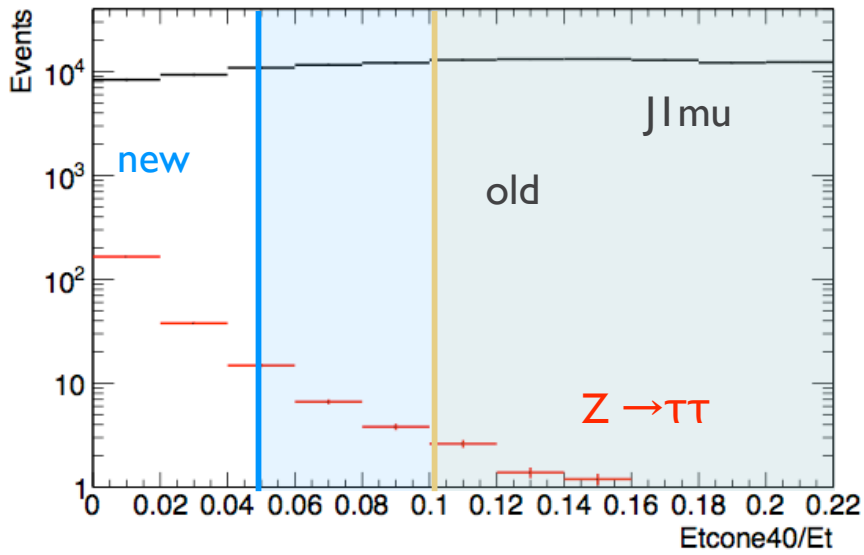


- NuCone40 behaves in a similar way at 7 TeV and 10 TeV
- EtCone40 shows differences → needs to be investigated further

100 pb^{-1} scenario: QCD muon backgrounds

Change the isolation cut for muons
- old: nucone40 = 0, etcone40/Et < 0.1
- new nucone40 = 0, etcone40/Et < 0.05

Backgrond due to JXmu reduced from 68% of the signal to 43%
Price: lost 2.6% of the signal
A proper optimization is needed



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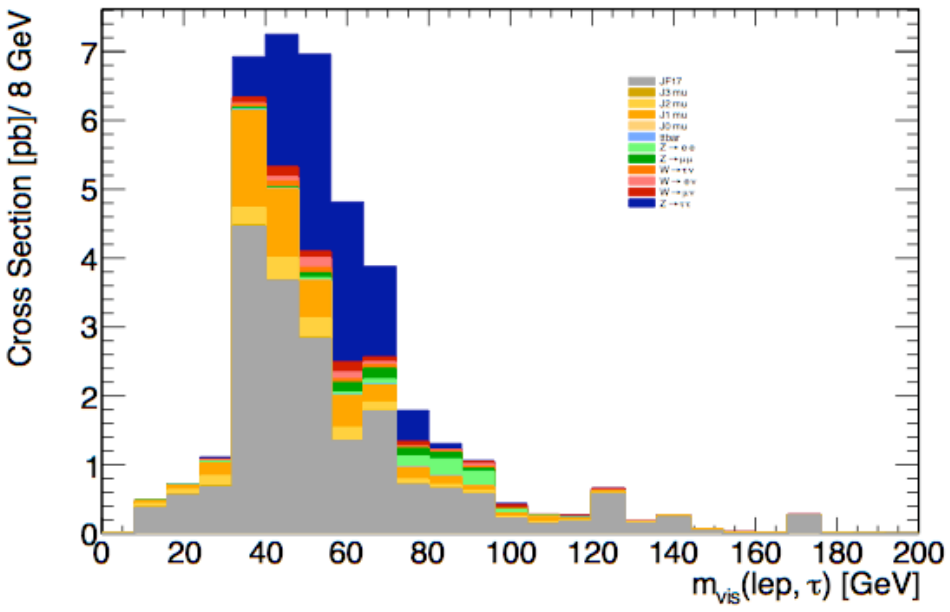
Generated	860	824396	826060	219525	28893
IsTriggered	193	166618	293617	109954	17363
PassedCleaning	193	166618	293617	109954	17363
HasLepton	107	7296	48072	40532	9348
HasIsolatedLepton	87.0	514	1764	350	13.3
HasChosenLepton	81.0	514	1764	348	12.4
HasTauJet	11.7	1.27	21.9	8.38	0.402
SumCosDeltaPhi	10.8	0.796	14.9	5.92	0.296
TransMass	10.5	0.795	14.9	5.91	0.295
DileptonVeto	10.4	0.784	14.8	5.78	0.278
TauJetNumTrack1or3	9.64	0.266	5.75	2.24	0.109
TauJetUnitCharge	9.60	0.219	5.29	2.05	0.101
OppositeSign	9.44	0.151	2.75	1.07	0.0551
VisMass	9.43	0.151	2.75	1.07	0.0545
VisMass2	8.89	0.0992	2.00	0.665	0.023

100 pb^{-1} scenario: QCD electron background



	Z	$\tau\tau$ at 7 TeV	JF17 at 7 TeV
Generated		860	97707024
IsTriggered		193	1031584
PassedCleaning		193	1031584
HasLepton		107	105665
HasIsolatedLepton		89.2	8657
HasChosenLepton		83.1	7502
HasTauJet		12.0	154
SumCosDeltaPhi		11.1	96.5
TransMass		10.8	96.3
DileptonVeto		10.7	95.3
TauJetNumTrack1or3		9.90	39.5
TauJetUnitCharge		9.85	36.7
OppositeSign		9.69	19.7
VisMass		9.68	19.4
VisMass2		9.14	13.2

- Very high background contribution
- Comparisons to filtered JXe at 10 TeV not trivial → Jxe might be helpful
- There are real W and Z in JF17. The filter asks for electromagnetic clusters so may enhance their contribution. It is necessary to subtract events with real W and Z (running at the moment, we will update)

Summary

Summary at 7 TeV in 100 pb^{-1}

- Signal at VisMass (VisMass 2): 968 (914) events,
  with isolation improvement: 943 (889) events
- W at VisMass (VisMass 2): 168 (121) events
- Z at VisMass (VisMass 2): 157 (65) events
- ttbar at VisMass (VisMass 2): 10 (5.3) events
- Qcd Jmu at VisMass (VisMass 2): 662 (464) events
  with isolation improvement: 405 (279) → needs optimization
- JF17 at VisMass (VisMass 2): 1940 (1320) events → to be investigated further

Early data comparisons

Data:

Muon channel → MuonSWBeam-SGLMU

group10.perf-tau.data10_7TeV.MuonswBeam-DESD_SGLMU .00-05-00.tauPerfD3PD/

Available runs: 152221, 152214, 152345, 152409, 152441, 152777, 152844, 152845, 152878, 152994 , 153136, 153159, 153200, 153565, 152878, 152994, 154810, 154813, 154817, 154822, 155160, 155112

Electron channel → L1CaloEM-SGLEL and L1Calo-SGLEL

group10.perf-tau.data10_7TeV.L1CaloEM-DESD_SGLEL.00-05-00.tauPerfD3PD/

group10.perf-tau.data10_7TeV.L1Calo-DESD_SGLEL .00-05-00.tauPerfD3PD/

Available runs: 152166, 152221, 152214, 152345, 152409, 152508,152777, 152844, 152845, 152878, 152994, 153134, 153136, 153159, 153200, 153565, 152878, 152994, 155112

Luminosity: Muon channel → 5.1 nb^{-1}, Electron channel → 4.9 nb^{-1}

no signal events expected with this lumi

MC:

- ESDs e468_s765_s767_r1250 (r1251 for QCD)

group10.perf-tau.mc09_7TeV_r1250_fromESD.00-05-00.tauPerfD3PD/

- Muon channel: J0-J3 muon filtered, $W \rightarrow \mu\nu$, $W \rightarrow \tau\nu$, $Z \rightarrow \mu\mu$, $Z \rightarrow \tau\tau$
- Electron channel: J0- J3, $W \rightarrow e\nu$, $W \rightarrow \tau\nu$, $Z \rightarrow ee$, $Z \rightarrow \tau\tau$

- Use MetRefFinal
- All plots normalized to entries of data and MC weighted by cross section
- Run with C++ analysis code, fully validated against Benchmark Analysis
- Looser object selection (details later) and no lepton isolation

GRL

MUON CHANNEL

muon CP + tau CP (period A and B)

find r 153565+ and dq atlgl LBSUMM#DetStatus-v02-pass1 g and lhc stablebeams true and ptag data10_7TeV and mag s and mag t > 20000 and dq cp_mu_mmuidcb LBSUMM#DetStatus-v02-pass1 g and dq cp_mu_mstaco LBSUMM#DetStatus-v02-pass1 g and dq cp_met_met LBSUMM#DetStatus-v02-pass1 y+ and dq tigb LBSUMM#DetStatus-v02-pass1 g and dq cp_tau y+ and dq taub y+

ELECTRON CHANNEL

egamma CP + tau CP

see egamma sharepoint:
https://espace.cern.ch/atlas-egamma/egamma-2010/Lists/DQ%20%20GRLB/DispForm.aspx?ID=24
https://espace.cern.ch/atlas-egamma/egamma-2010/Lists/DQ%20%20GRLB/DispForm.aspx?ID=23

and dq cp_tau y+ and dq taub y+

+ EtMiss requirments (from period A)

find run 152166+ and partition ATLAS and db DATA and lhc stablebeams T and st physics_MinBias and ptag data10_7TeV and dq ATLGL SHIFTOFL#HEAD g and dq atltor SHIFTOFL#HEAD g and dq atlsol SHIFTOFL#HEAD g and dq pix SHIFTOFL#HEAD g and dq sct SHIFTOFL#HEAD g and dq trtb,trte SHIFTOFL#HEAD y+ and dq CP_TRACKING SHIFTOFL#HEAD y+ and dq CP_MET SHIFTOFL#HEAD y+ and dq CP_JET_JETEC SHIFTOFL#HEAD y+ and dq CP_JET_JETEA SHIFTOFL#HEAD y+ and dq CP_JET_JETB SHIFTOFL#HEAD y+ and dq CP_JET_JETFC SHIFTOFL#HEAD y+ and dq CP_JET_JETFA SHIFTOFL#HEAD y+

Collision Candidates, Trigger and Cleaning

- Collision Candidates:
  - BCID (run dependent)
  - primary vertex (type == 1)
  - at least 4 tracks associated to the primary vertex

- Trigger:
  - Muon channel: L1_MU0
  - Electron channel: L1_EM2

- Jet - EtMiss Cleaning:

exclusion of events with jets (at em-scale and p_T > 10 GeV) satisfying one of these conditions (bad jets):

  - n90 <= 5 && hecFrac > 0.8
  - quality > 0.8 && emfrac > 0.95
  - fabs(timing) > 50 ns

Checked the effect on a $Z \rightarrow \tau\tau$ MC sample: < 0.01 % of taus removed by cleaning

Lepton Selection

Lepton selection from WZ observation selection

MUONS

Preselection:

- Only staco muons in D3PDs
- p_T > 10 GeV
- spectrometer pt > 10 GeV
- |z - z0_pv| < 10 mm
- eta < 2.4
- isCombined
- ptcone40/p_T < 0.1
- no author, match quality, charge requirements

Overlap Removal:

- with overlap removed muons and preselected electrons
- cone 0.2

Selection:

- no other isolation requirement
- highets p_T (no tighter p_T cuts applied)

ELECTRONS

Preselection:

- p_T > 10 GeV
- η < 2.47, no crack region (1.37 < η < 1.52)
- author 1 or 3
- loose ID
- no Egamma Fiducial cuts (still under discussion)

Overlap Removal:

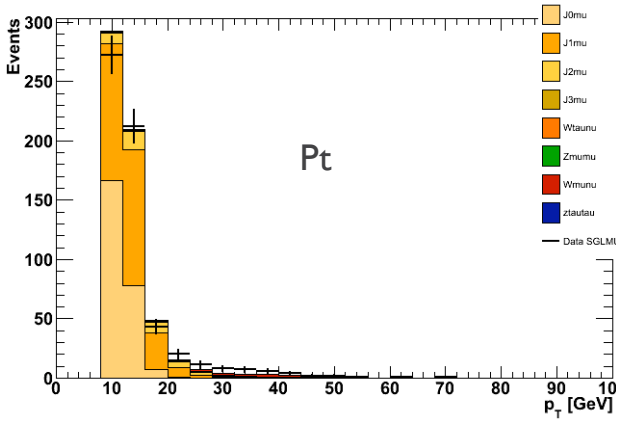
- with overlap removed muons and preselected electrons
- cone 0.2

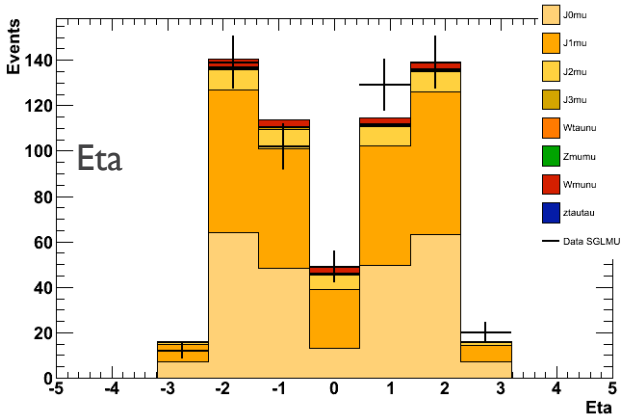
Selection:

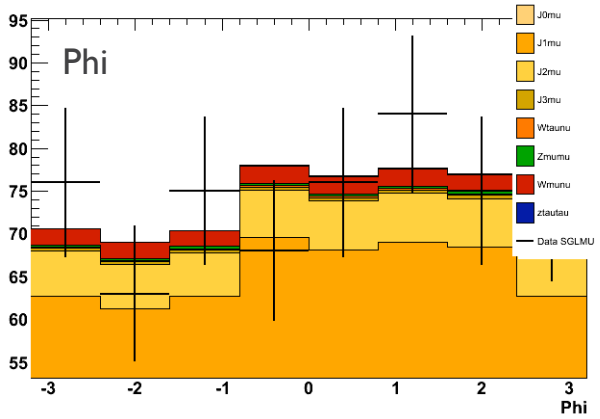
- no isolation requirement
- highest p_T (no tighter p_T cuts applied)
- medium ID
- tight isEM not applied, looking for candidates with tight robust

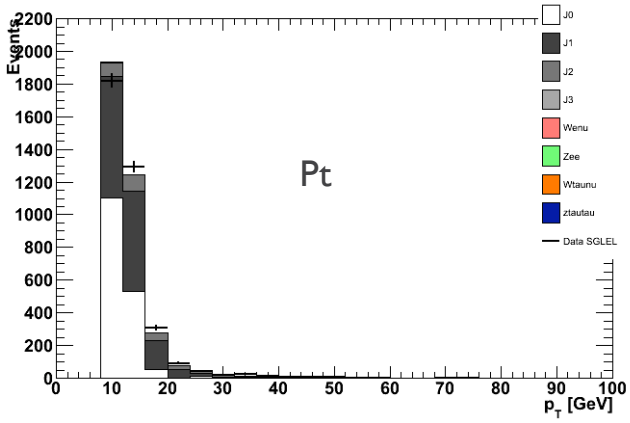
Selected Leptons

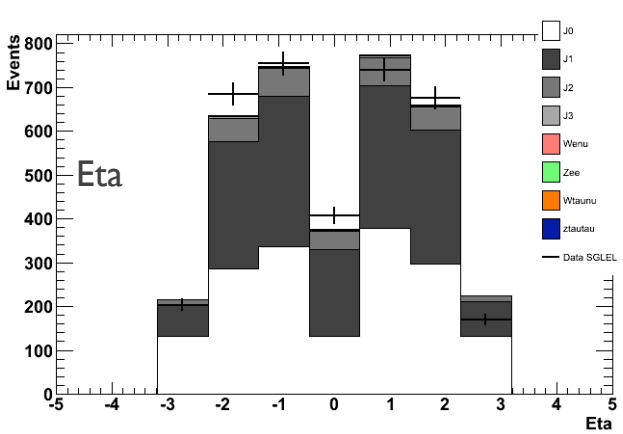
MUON CHANNEL

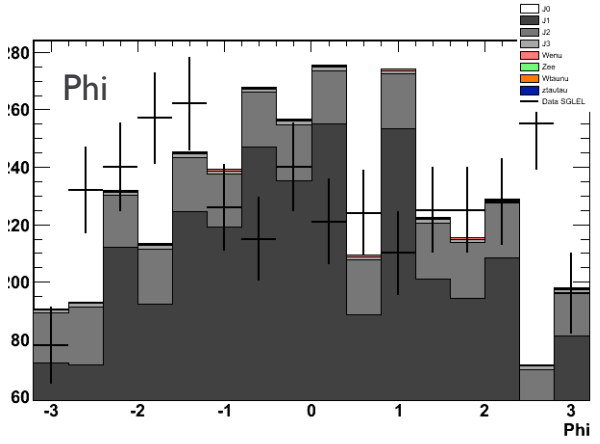






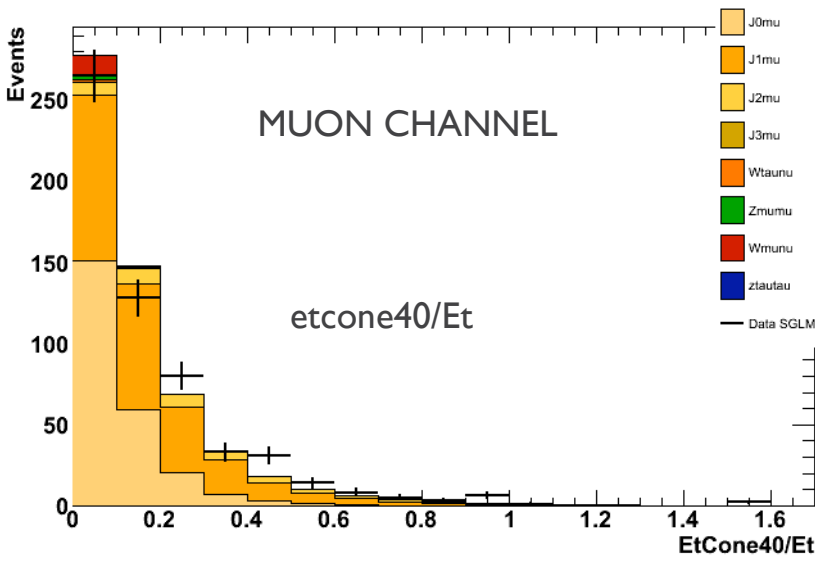


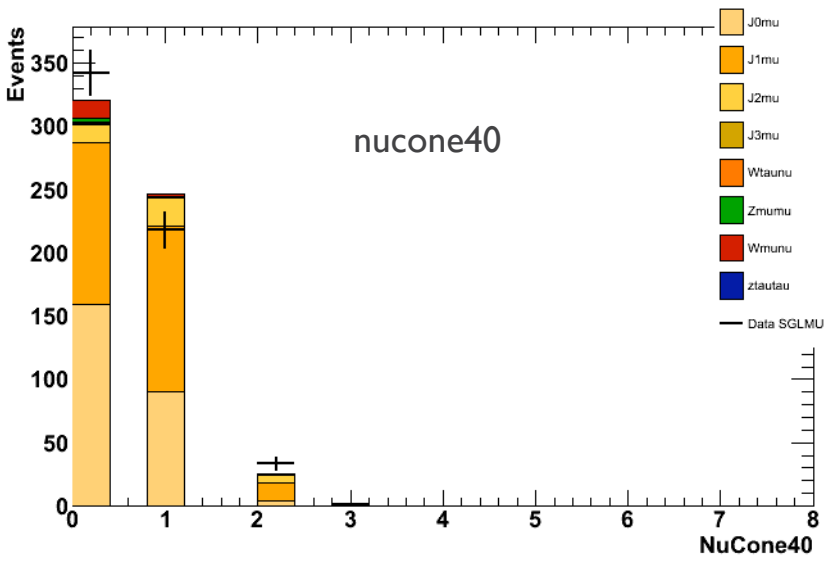


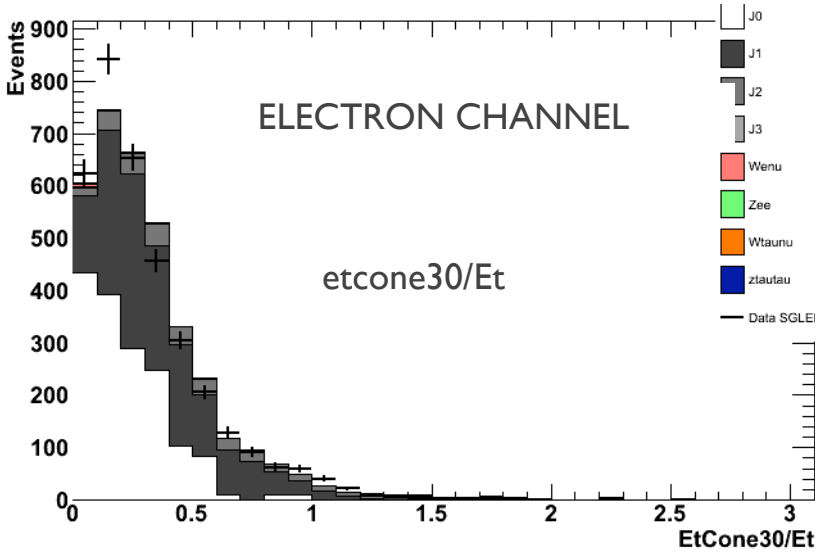


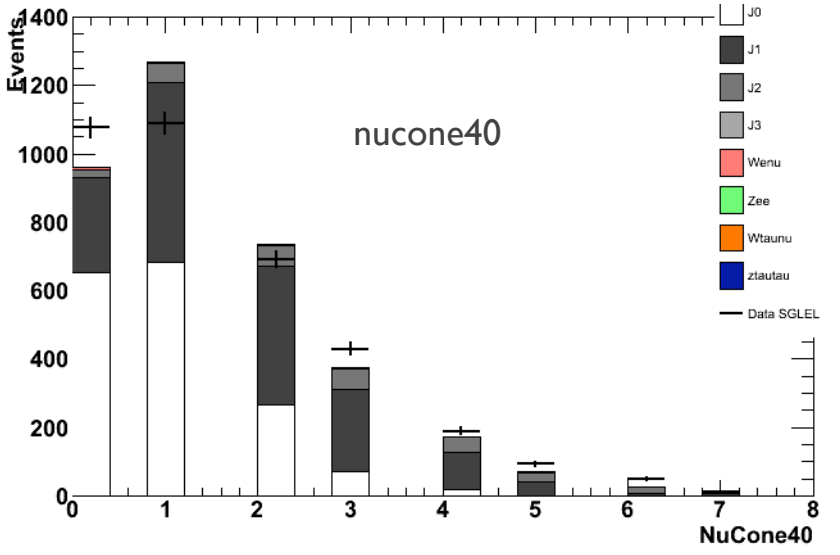
ELECTRON CHANNEL

Isolation variables









Tau Selection

Preselection

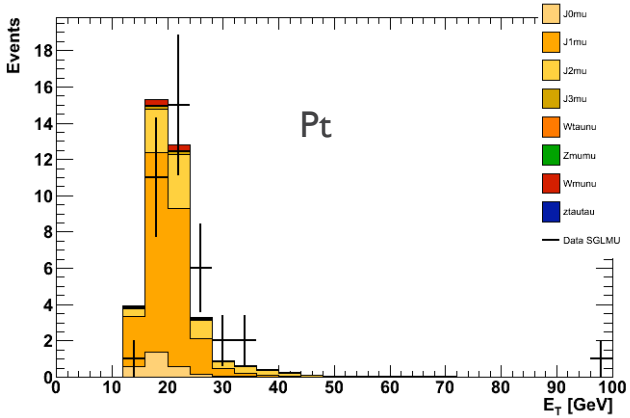
- E_T > 15 GeV
- η < 2.5
- author == 3
- leading track p_T > 6 GeV
- TauSafeMedium ID
- No electron or muon veto

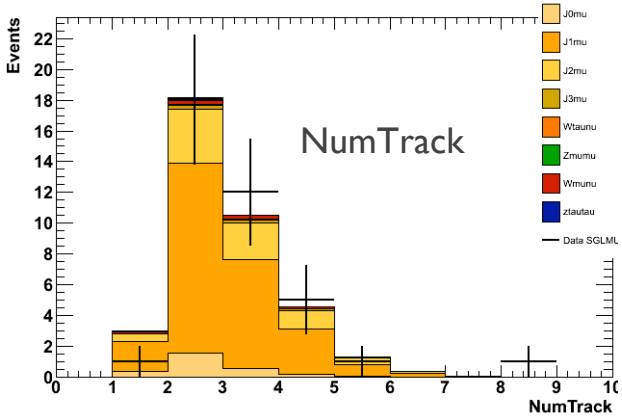
Overlap Removal

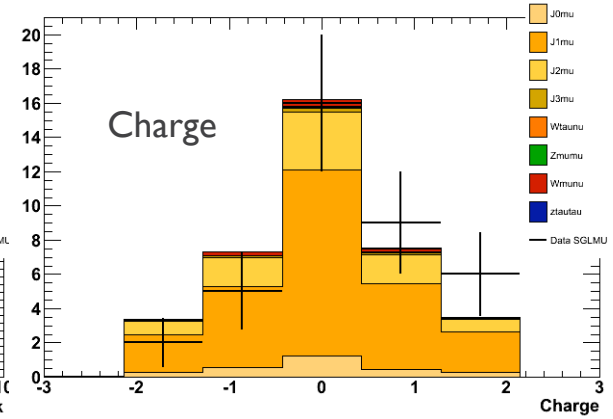
- with olr muons, olr electrons, preselected taus
- cone 0.4

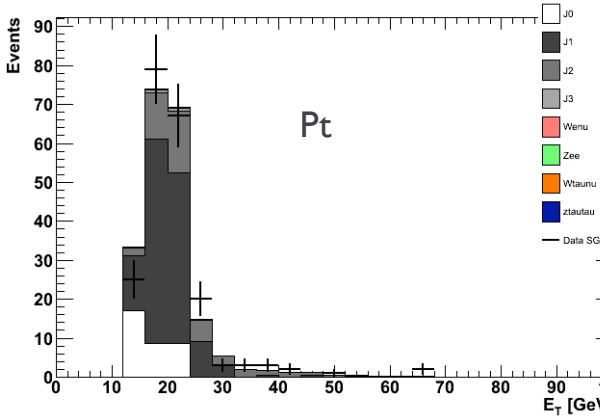
Tau Jets in our selection (lepton selected + tau-jet selected)

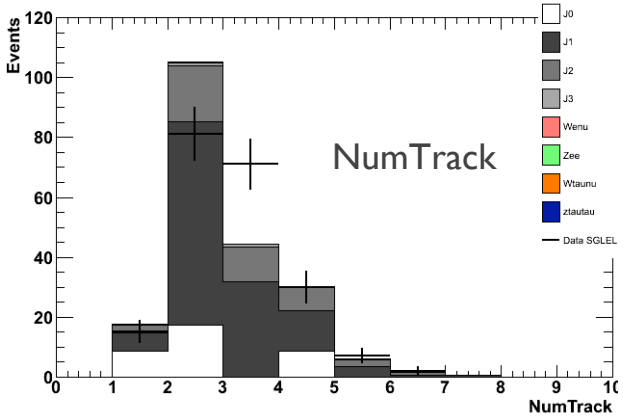
MUON CHANNEL

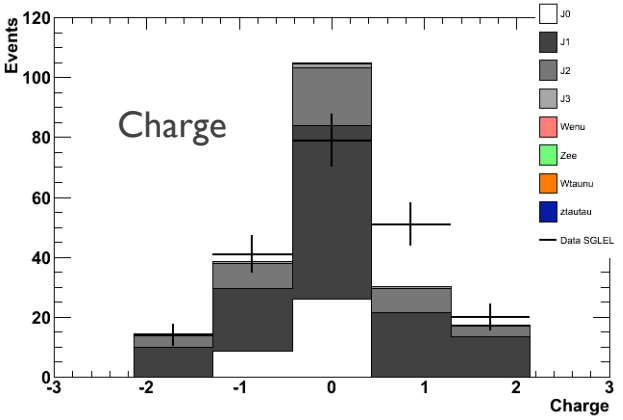






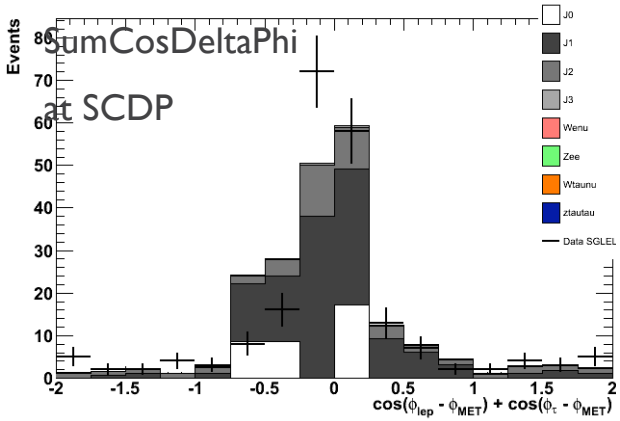


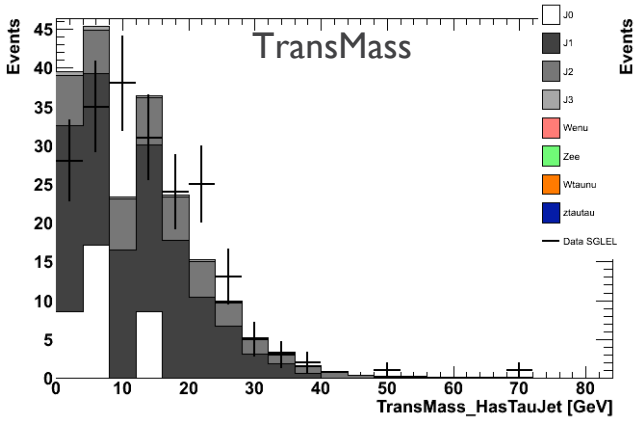


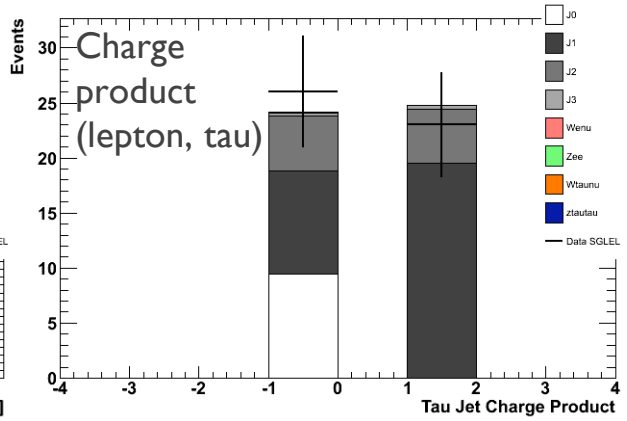


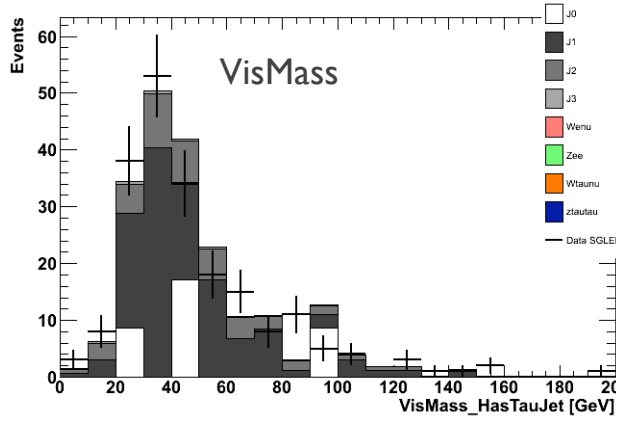
ELECTRON CHANNEL

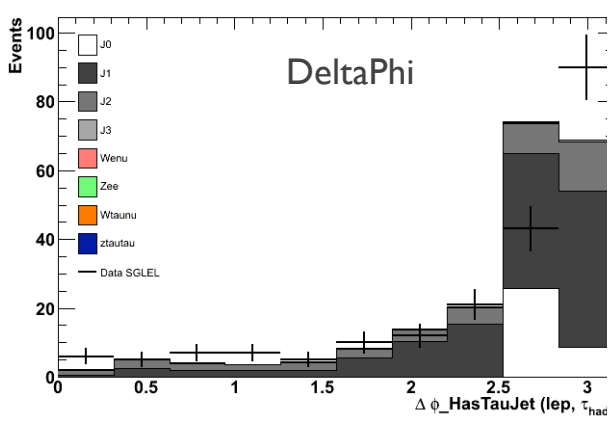
Cut variables at HasTauJet (electron channel)

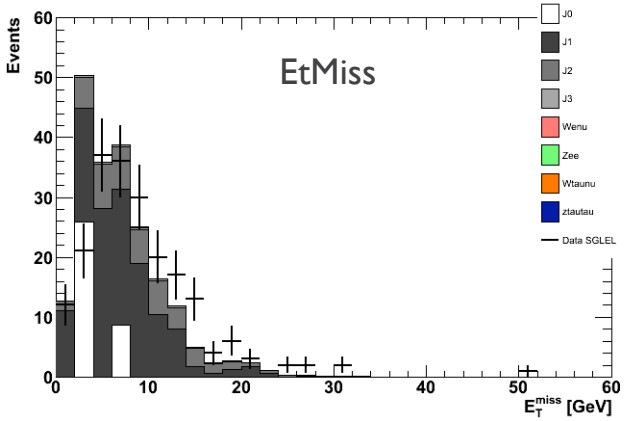




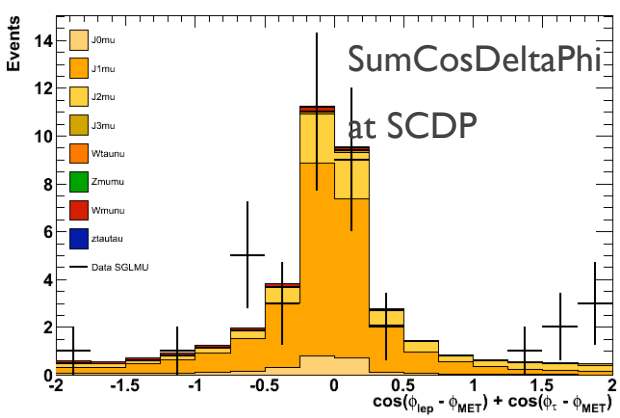


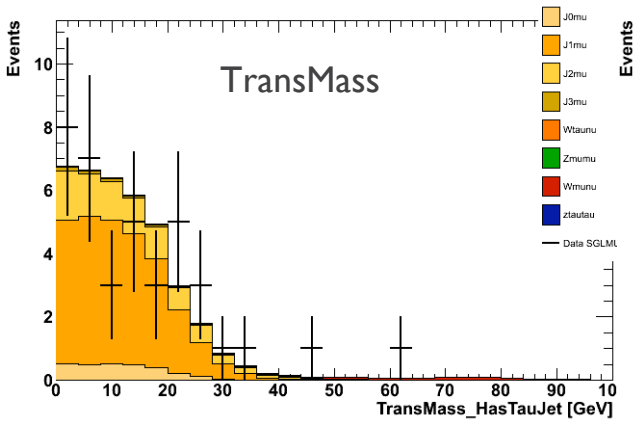


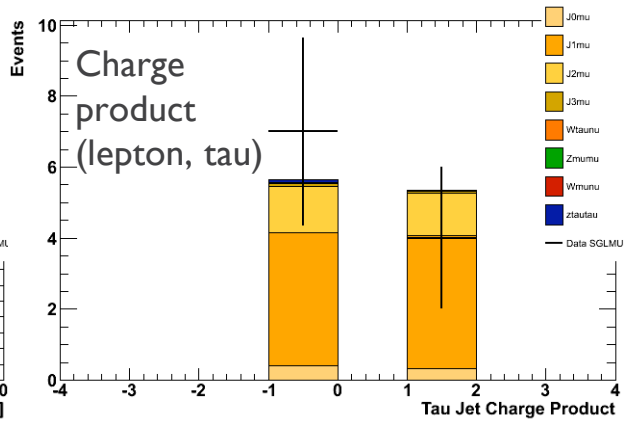


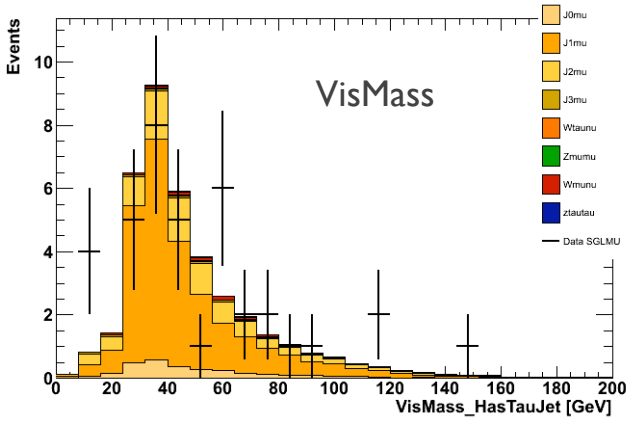


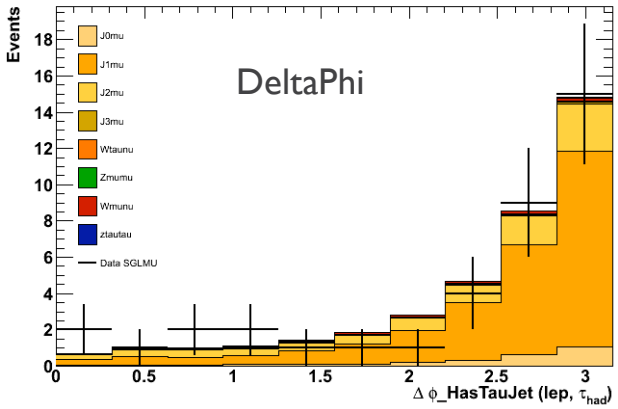
Cut variables at HasTauJet (muon channel)

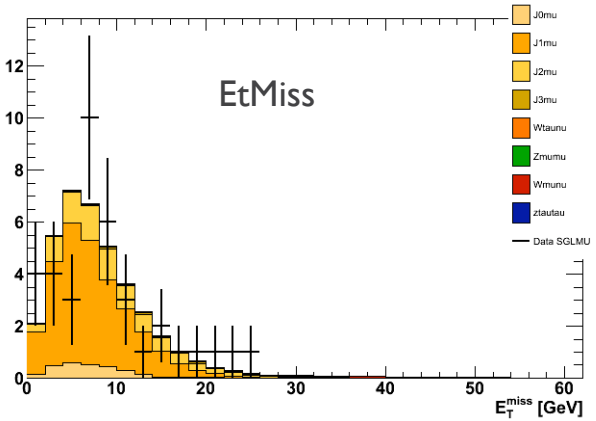










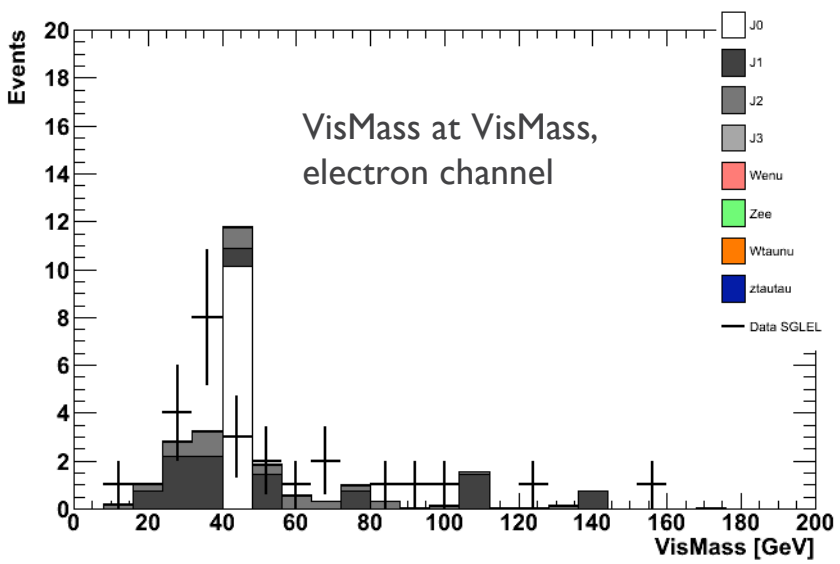


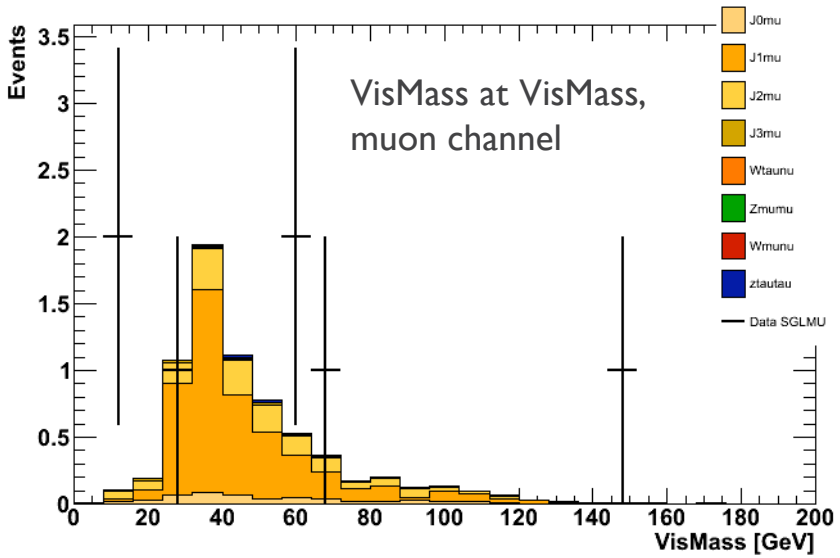
Events passing the selection

Electron channel:
26 events surviving the full selection.
Luminosity = 4.9 nb^{-1}

Muon channel:
6 events surviving in the muon channel.
Luminisity = 5.1 nb^{-1}

Signal events expected:
~ 0.05 events expected from the benchmark analysis
~ 0.17 events expected for the loosened analysis





Summary

- The baseline selection for the $Z \rightarrow \tau\tau$ analysis in early data is set up
- The agreement with MC seems nice, more data statistics is needed
- All of the events passing the present selection are clearly background
- Updating continuosly with new data

Backup

QCD backgrounds: need to factorize

Raw events: too few events surviving the whole cutflow

It is necessary to artificially increase the size of the dataset

Factorization of the two hardest cuts against qcd: lepton isolation and TauID

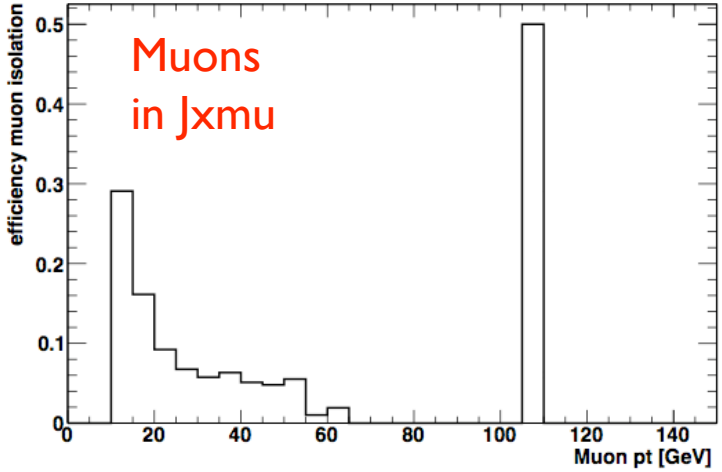
Cut Name	Raw	Raw	Raw	Raw	Raw
Generated	483382.000	497622.000	491543.000	497766.000	9633419.000
HasLepton	5003.000	34063.000	106625.000	189187.000	11718.000
HasIsolatedLepton	1333.000	2228.000	839.000	253.000	903.000
HasChosenLepton	1333.000	2227.000	824.000	223.000	777.000
HasTauJet	3.000	23.000	26.000	6.000	24.000
SumCosDeltaPhi	3.000	15.000	18.000	4.000	17.000
TransMass	3.000	15.000	18.000	4.000	17.000
DileptonVeto	3.000	15.000	17.000	4.000	17.000
TauJetNumTrack1or3	1.000	4.000	9.000	1.000	7.000
TauJetUnitCharge	1.000	4.000	9.000	1.000	7.000
OppositeSign	0.000	2.000	3.000	1.000	5.000
VisMass	0.000	2.000	3.000	1.000	5.000
VisMass2	0.000	2.000	2.000	1.000	4.000

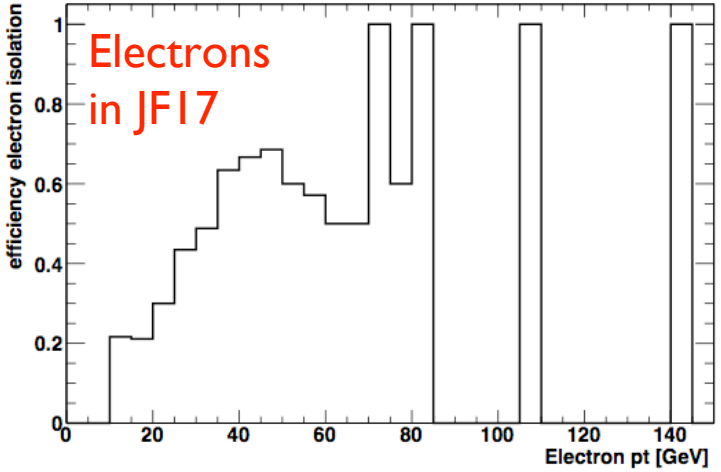
QCD background: isolation factorization

Instead of cutting on the isolation variables consider a looser isolation cut
MUONS tigh isolation: nucone40 = 0, etcone40/pt < 0.1
loose isolation: nucone40 < 3, etcone40/pt < 0.2
ELECTRONS tight isolation nucone40 = 0, etcone30/pt < 0.12
loose isolation; nucone40 <3, etcone30/pt < 0.2

Weight the events passing the loose isolation cut with the ratio of events passing the tight isolation cut over events passing the loose isolation cut in bins of p_T

The validity of this approach depends on two assumptions:
• No dependence of the fake rate on the cuts before isolation (trigger requirement could be a problem?)
• No correlations between the isolation variables and other variables used further in the cut flow (confirmed in Benchmark analysis at 10 TeV)





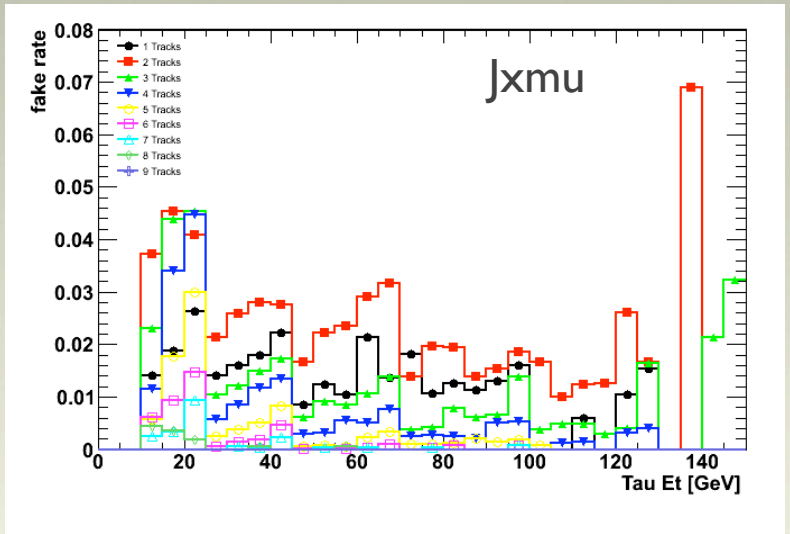
QCD background: TauID factorization

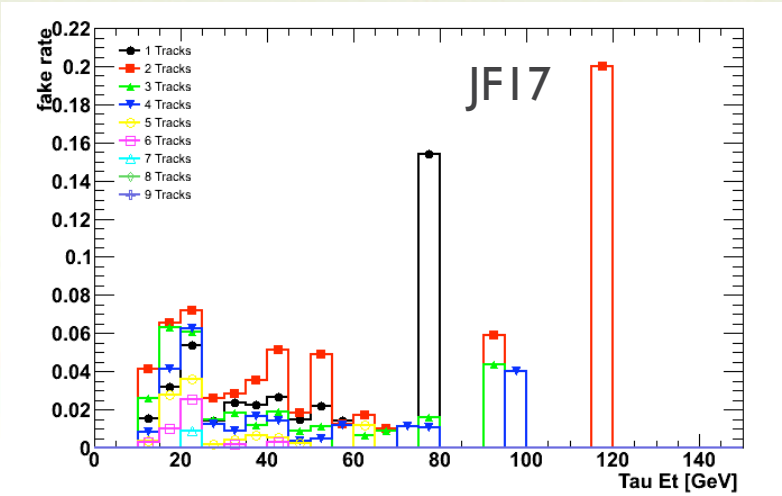
Same idea as the isolation factorization:

Tau Selection no ID:
- E_T > 15 GeV
- $|\eta|$ < 2.5

Tau Selection ID:
- electron veto medium == 0
- muon_veto == 0
- author == 3
- TauID (CutSafeTight)

Since the nature of jets (light or heavy flavour quarks, gluon jets) can possibly affect how jets fake tau, the presence of a selected lepton in the event is required as well.





Efficiencies wrt generated events, 7 TeV r1250(1)

	$Z \to \tau\tau$ at 7 TeV	$W \to e\nu$ at 7 TeV	$W \to \mu\nu$ at 7 TeV	$W \to \tau\nu$ at 7 TeV	$Z \to ee$ at 7 TeV	$Z \to \mu\mu$ at 7 TeV
Generated	1.00	1.00	1.00	1.00	1.00	1.00
IsTriggered	0.225	0.718	0.683	0.364	0.866	0.85
PassedCleaning	0.225	0.718	0.683	0.364	0.866	0.85
HasLepton	0.125	0.496	0.616	0.205	0.699	0.805
HasIsolatedLepton	0.104	0.38	0.538	0.169	0.579	0.752
HasChosenLepton	0.0966	0.287	0.406	0.161	0.302	0.369
HasTauJet	0.014	2.14×10^{-3}	2.96×10^{-3}	1.60×10^{-3}	4.11×10^{-3}	3.64×10^{-3}
SumCosDeltaPhi	0.0129	325×10^{-6}	478×10^{-6}	538×10^{-6}	3.00×10^{-3}	2.00×10^{-3}
TransMass	0.0126	216×10^{-6}	305×10^{-6}	493×10^{-6}	2.79×10^{-3}	1.89×10^{-3}
DileptonVeto	0.0125	215×10^{-6}	304×10^{-6}	493×10^{-6}	1.82×10^{-3}	1.24×10^{-3}
TauJetNumTrack1or3	0.0115	96.3×10^{-6}	128×10^{-6}	206×10^{-6}	1.37×10^{-3}	933×10^{-6}
TauJetUnitCharge	0.0115	95.3×10^{-6}	125×10^{-6}	205×10^{-6}	1.28×10^{-3}	930×10^{-6}
OppositeSign	0.0113	63.2×10^{-6}	99.1×10^{-6}	152×10^{-6}	1.11×10^{-3}	796×10^{-6}
VisMass	0.0113	63.2×10^{-6}	99.1×10^{-6}	152×10^{-6}	1.11×10^{-3}	796×10^{-6}
VisMass2	0.0106	46.1×10^{-6}	71.0×10^{-6}	111×10^{-6}	284×10^{-6}	508×10^{-6}

	$t\bar{t}$ at 7 TeV	J0mu at 7 TeV	J1mu at 7 TeV	J2mu at 7 TeV	J3mu at 7 TeV	JF17 at 7 TeV
Generated	1.00	1.00	1.00	1.00	1.00	1.00
IsTriggered	0.664	0.202	0.355	0.501	0.601	0.0106
PassedCleaning	0.664	0.202	0.355	0.501	0.601	0.0106
HasLepton	0.536	8.85×10^{-3}	0.0582	0.185	0.324	1.08×10^{-3}
HasIsolatedLepton	0.375	1.02×10^{-3}	3.50×10^{-3}	2.65×10^{-3}	766×10^{-6}	88.6×10^{-6}
HasChosenLepton	0.149	1.02×10^{-3}	3.50×10^{-3}	2.63×10^{-3}	707×10^{-6}	76.8×10^{-6}
HasTauJet	0.0109	2.54×10^{-6}	43.5×10^{-6}	63.3×10^{-6}	23.0×10^{-6}	1.58×10^{-6}
SumCosDeltaPhi	5.14×10^{-3}	1.59×10^{-6}	29.7×10^{-6}	44.7×10^{-6}	17.0×10^{-6}	988×10^{-9}
TransMass	2.91×10^{-3}	1.58×10^{-6}	29.7×10^{-6}	44.7×10^{-6}	16.9×10^{-6}	985×10^{-9}
DileptonVeto	2.39×10^{-3}	1.56×10^{-6}	29.5×10^{-6}	43.7×10^{-6}	16.0×10^{-6}	975×10^{-9}
TauJetNumTrack1or3	1.41×10^{-3}	529×10^{-9}	11.4×10^{-6}	17.0×10^{-6}	6.27×10^{-6}	405×10^{-9}
TauJetUnitCharge	1.39×10^{-3}	437×10^{-9}	10.5×10^{-6}	15.5×10^{-6}	5.81×10^{-6}	376×10^{-9}
OppositeSign	1.14×10^{-3}	301×10^{-9}	5.46×10^{-6}	8.10×10^{-6}	3.17×10^{-6}	201×10^{-9}
VisMass	1.13×10^{-3}	301×10^{-9}	5.46×10^{-6}	8.06×10^{-6}	3.13×10^{-6}	198×10^{-9}
VisMass2	603×10^{-6}	198×10^{-9}	3.98×10^{-6}	5.03×10^{-6}	1.32×10^{-6}	135×10^{-9}

Efficiencies wrt previous cut, 7 TeV r1250(1)

	$Z \to \tau\tau$ at 7 TeV	$W \to e\nu$ at 7 TeV	$W \to \mu\nu$ at 7 TeV	$W \to \tau\nu$ at 7 TeV	$Z \to ee$ at 7 TeV	$Z \to \mu\mu$ at 7 TeV
Generated	1.00	1.00	1.00	1.00	1.00	1.00
IsTriggered	0.225	0.718	0.683	0.364	0.866	0.85
PassedCleaning	1.00	1.00	1.00	1.00	1.00	1.00
HasLepton	0.555	0.691	0.902	0.562	0.807	0.946
HasIsolatedLepton	0.833	0.766	0.873	0.827	0.828	0.935
HasChosenLepton	0.931	0.757	0.756	0.952	0.521	0.49
HasTauJet	0.144	7.43×10^{-3}	7.29×10^{-3}	9.92×10^{-3}	0.0136	9.87×10^{-3}
SumCosDeltaPhi	0.922	0.152	0.161	0.337	0.73	0.55
TransMass	0.979	0.664	0.638	0.916	0.928	0.943
DileptonVeto	0.992	0.995	0.997	1.00	0.655	0.66
TauJetNumTrack1or3	0.921	0.449	0.421	0.418	0.75	0.75
TauJetUnitCharge	0.996	0.99	0.977	0.995	0.935	0.996
OppositeSign	0.983	0.663	0.792	0.741	0.865	0.856
VisMass	1.00	1.00	1.00	1.00	1.00	1.00
VisMass2	0.944	0.73	0.717	0.73	0.256	0.639

	$t\bar{t}$ at 7 TeV	J0mu at 7 TeV	J1mu at 7 TeV	J2mu at 7 TeV	J3mu at 7 TeV	JF17 at 7 TeV
Generated	1.00	1.00	1.00	1.00	1.00	1.00
IsTriggered	0.664	0.202	0.355	0.501	0.601	0.0106
PassedCleaning	1.00	1.00	1.00	1.00	1.00	1.00
HasLepton	0.808	0.0438	0.164	0.369	0.538	0.102
HasIsolatedLepton	0.701	0.115	0.0602	0.0144	2.37×10^{-3}	0.0819
HasChosenLepton	0.397	1.00	1.00	0.994	0.923	0.867
HasTauJet	0.0732	2.49×10^{-3}	0.0124	0.024	0.0325	0.0206
SumCosDeltaPhi	0.471	0.625	0.682	0.707	0.739	0.625
TransMass	0.566	0.999	1.00	0.999	0.997	0.998
DileptonVeto	0.82	0.987	0.992	0.978	0.945	0.989
TauJetNumTrack1or3	0.591	0.338	0.389	0.388	0.392	0.415
TauJetUnitCharge	0.986	0.826	0.92	0.912	0.927	0.928
OppositeSign	0.821	0.69	0.519	0.523	0.545	0.536
VisMass	0.989	1.00	1.00	0.996	0.988	0.984
VisMass2	0.535	0.657	0.729	0.624	0.423	0.682

Acceptance tables old reprocessing vs 10 TeV

	Cross section [pb]		Efficiency wrt previous cut		Efficiency wrt Generated	
	$Z \to \tau\tau$ at 7 TeV	$Z \to \tau\tau$ at 10 TeV	$Z \to \tau\tau$ at 7 TeV	$Z \to \tau\tau$ at 10 TeV	$Z \to \tau\tau$ at 7 TeV	$Z \to \tau\tau$ at 10 TeV
Generated	860	1128	1.00	1.00	1.00	1.00
HasLepton	122	141	0.142	0.125	0.142	0.125
HasTriggerMatchedLepton	111	129	0.907	0.914	0.129	0.114
HasIsolatedLepton	90.1	102	0.812	0.794	0.105	0.0908
HasChosenLepton	83.7	94.6	0.929	0.924	0.0973	0.0838
HasTauJet	12.6	10.6	0.15	0.112	0.0146	9.42×10^{-3}
SumCosDeltaPhi	11.7	9.91	0.928	0.932	0.0136	8.78×10^{-3}
TransMass	11.4	9.70	0.98	0.979	0.0133	8.59×10^{-3}
DileptonVeto	11.4	9.66	0.994	0.996	0.0132	8.56×10^{-3}
TauJetNumTrack1or3	10.4	9.13	0.916	0.945	0.0121	8.09×10^{-3}
TauJetUnitCharge	10.4	9.13	0.995	1.00	0.012	8.09×10^{-3}
OppositeSign	10.2	8.99	0.987	0.985	0.0119	7.97×10^{-3}
VisMass	10.2	8.99	1.00	1.00	0.0119	7.97×10^{-3}
VisMass2	9.57	8.14	0.937	0.905	0.0111	7.21×10^{-3}
METCut	1.89	1.68	0.198	0.206	2.20×10^{-3}	1.49×10^{-3}
DPhi	1.00	0.918	0.528	0.547	1.16×10^{-3}	813×10^{-6}
InvMass	0.642	0.654	0.641	0.713	746×10^{-6}	579×10^{-6}
InvMass2	0.0624	0.0415	0.0972	0.0634	72.5×10^{-6}	36.7×10^{-6}

Acceptance tables old reprocessing vs 10 TeV

Cross section [pb]

	$W \to e\nu$ at 7 TeV	$W \to e\nu$ at 10 TeV	$W \to \mu\nu$ at 7 TeV	$W \to \mu\nu$ at 10 TeV	$W \to \tau\nu$ at 7 TeV	$W \to \tau\nu$ at 10 TeV
Generated	7761	10353	7761	10353	2747	3664
HasLepton	4275	4758	5566	6789	646	753
HasTriggerMatchedLepton	4274	4712	4876	5867	578	685
HasIsolatedLepton	3188	3787	4261	4925	470	544
HasChosenLepton	2401	2781	3196	3681	446	514
HasTauJet	17.4	10.8	24.0	14.2	4.42	2.67
SumCosDeltaPhi	2.64	1.83	3.82	2.23	1.34	0.867
TransMass	1.62	1.19	2.52	1.33	1.23	0.793
DileptonVeto	1.60	1.19	2.51	1.33	1.23	0.793
TauJetNumTrack1or3	0.638	0.628	1.22	0.779	0.544	0.426
TauJetUnitCharge	0.638	0.628	1.20	0.779	0.541	0.426
OppositeSign	0.412	0.458	0.90	0.561	0.407	0.309
VisMass	0.412	0.458	0.90	0.555	0.404	0.294
VisMass2	0.264	0.311	0.652	0.405	0.31	0.176
METCut	0.0311	0.0819	0.233	0.0986	0.126	0.103
DPhi	0.0233	0.06	0.0776	0.0519	0.0769	0.0588
InvMass	7.78×10^{-3}	0.0273	0.0543	0.0208	0.0275	0.00
InvMass2	0.00	0.00	0.00	0.00	2.75×10^{-3}	0.00

Efficiency wrt previous cut

	$W \to e\nu$ at 7 TeV	$W \to e\nu$ at 10 TeV	$W \to \mu\nu$ at 7 TeV	$W \to \mu\nu$ at 10 TeV	$W \to \tau\nu$ at 7 TeV	$W \to \tau\nu$ at 10 TeV
Generated	1.00	1.00	1.00	1.00	1.00	1.00
HasLepton	0.551	0.46	0.717	0.656	0.235	0.206
HasTriggerMatchedLepton	1.00	0.99	0.876	0.864	0.895	0.91
HasIsolatedLepton	0.746	0.804	0.874	0.839	0.812	0.794
HasChosenLepton	0.753	0.734	0.75	0.747	0.95	0.945
HasTauJet	7.23×10^{-3}	3.90×10^{-3}	7.50×10^{-3}	3.85×10^{-3}	9.91×10^{-3}	5.21×10^{-3}
SumCosDeltaPhi	0.152	0.169	0.159	0.157	0.303	0.324
TransMass	0.614	0.649	0.661	0.599	0.916	0.915
DileptonVeto	0.99	1.00	0.994	1.00	0.998	1.00
TauJetNumTrack1or3	0.398	0.528	0.486	0.584	0.444	0.537
TauJetUnitCharge	1.00	1.00	0.987	1.00	0.995	1.00
OppositeSign	0.646	0.73	0.748	0.72	0.751	0.724
VisMass	1.00	1.00	1.00	0.991	0.993	0.952
VisMass2	0.642	0.679	0.724	0.729	0.769	0.60
METCut	0.118	0.263	0.357	0.244	0.407	0.583
DPhi	0.75	0.733	0.333	0.526	0.609	0.571
InvMass	0.333	0.455	0.70	0.40	0.357	0.00
InvMass2	0.00	0.00	0.00	0.00	0.00	0.00

Acceptance tables old reprocessing vs 10 TeV

Cross section [pb]

	$Z \to ee$ at 7 TeV	$Z \to ee$ at 10 TeV	$Z \to \mu\mu$ at 7 TeV	$Z \to \mu\mu$ at 10 TeV
Generated	826	1098	826	1098
HasLepton	613	724	711	899
HasTriggerMatchedLepton	613	719	673	831
HasIsolatedLepton	502	617	626	742
HasChosenLepton	257	309	307	380
HasTauJet	3.53	2.68	3.12	2.35
SumCosDeltaPhi	2.58	1.87	1.80	1.36
TransMass	2.42	1.85	1.69	1.26
DileptonVeto	1.76	1.57	1.05	0.808
TauJetNumTrack1or3	1.38	1.29	0.812	0.688
TauJetUnitCharge	1.32	1.29	0.812	0.688
OppositeSign	1.16	1.06	0.71	0.616
VisMass	1.16	1.06	0.71	0.616
VisMass2	0.352	0.155	0.487	0.356
METCut	5.50×10^{-3}	3.30×10^{-3}	0.0908	0.0242
DPhi	5.50×10^{-3}	2.20×10^{-3}	0.033	6.61×10^{-3}
InvMass	5.50×10^{-3}	1.10×10^{-3}	5.50×10^{-3}	3.31×10^{-3}
InvMass2	0.00	1.10×10^{-3}	0.00	0.00

Efficiency wrt previous cut

	$Z \to ee$ at 7 TeV	$Z \to ee$ at 10 TeV	$Z \to \mu\mu$ at 7 TeV	$Z \to \mu\mu$ at 10 TeV
Generated	1.00	1.00	1.00	1.00
HasLepton	0.743	0.659	0.861	0.818
HasTriggerMatchedLepton	1.00	0.993	0.946	0.924
HasIsolatedLepton	0.818	0.857	0.93	0.894
HasChosenLepton	0.513	0.502	0.491	0.511
HasTauJet	0.0137	8.67×10^{-3}	0.0102	6.19×10^{-3}
SumCosDeltaPhi	0.731	0.696	0.576	0.578
TransMass	0.939	0.992	0.94	0.929
DileptonVeto	0.725	0.845	0.622	0.641
TauJetNumTrack1or3	0.787	0.822	0.772	0.851
TauJetUnitCharge	0.956	1.00	1.00	1.00
OppositeSign	0.877	0.821	0.875	0.896
VisMass	0.998	0.998	1.00	1.00
VisMass2	0.305	0.147	0.686	0.578
METCut	0.0156	0.0213	0.186	0.0681
DPhi	1.00	0.667	0.364	0.273
InvMass	1.00	0.50	0.167	0.50
InvMass2	0.00	1.00	0.00	0.00

Qcd at 10 TeV

Cross section [pb]

	J1mu	J1e	J2mu	J2e	J3mu	J3e
Generated	884136	944812	286211	305255	41656	52152
HasLepton	54030	24938	58133	14027	15300	1810
HasTriggerMatchedLepton	41461	23826	44048	13002	11885	1565
HasIsolatedLepton	842	866	190	170	7.31	6.99
HasChosenLepton	842	866	190	170	7.27	6.96
HasTauJet	6.61	6.48	2.55	2.52	0.129	0.119
SumCosDeltaPhi	4.41	4.50	1.89	1.88	0.0974	0.094
TransMass	4.41	4.50	1.88	1.87	0.0972	0.094
DileptonVeto	4.36	4.49	1.86	1.86	0.093	0.0874
TauJetNumTrack1or3	2.32	2.23	1.05	1.01	0.0543	0.048
TauJetUnitCharge	2.12	2.07	0.975	0.956	0.0517	0.0474
OppositeSign	1.10	1.03	0.465	0.522	0.0284	0.0221
VisMass	1.09	1.03	0.464	0.52	0.0281	0.0221
VisMass2	0.753	0.687	0.27	0.305	0.0118	7.91×10^{-3}

Efficiency wrt previous cut

	J1mu	J1e	J2mu	J2e	J3mu	J3e
Generated	1.00	1.00	1.00	1.00	1.00	1.00
HasLepton	0.0611	0.0264	0.203	0.046	0.367	0.0347
HasTriggerMatchedLepton	0.767	0.955	0.758	0.927	0.777	0.865
HasIsolatedLepton	0.0203	0.0363	4.32×10^{-3}	0.0131	615×10^{-6}	4.47×10^{-3}
HasChosenLepton	1.00	1.00	1.00	1.00	0.995	0.995
HasTauJet	7.85×10^{-3}	7.49×10^{-3}	0.0134	0.0148	0.0178	0.0171
SumCosDeltaPhi	0.668	0.694	0.739	0.748	0.753	0.79
TransMass	0.999	1.00	0.999	0.995	0.997	1.00
DileptonVeto	0.988	0.997	0.985	0.994	0.957	0.93
TauJetNumTrack1or3	0.532	0.497	0.565	0.54	0.584	0.549
TauJetUnitCharge	0.914	0.929	0.929	0.951	0.953	0.989
OppositeSign	0.518	0.499	0.477	0.546	0.549	0.466
VisMass	0.998	1.00	0.999	0.997	0.989	0.998
VisMass2	0.688	0.664	0.582	0.585	0.422	0.359