

**Baseline analysis for WH, H->bb**

**Sources:**

lvqq: (winter note) <https://twiki.cern.ch/twiki/bin/view/AtlasProtected/HiggsWWsemilepConfNote2011Winter>  
 llqq: (winter note) <https://twiki.cern.ch/twiki/bin/view/AtlasProtected/HiggsZZllqq>  
 W/Z common:(2010 data) <https://espace.cern.ch/atlas-sm-wz-physics/Lists/Common%20Selection/AllItems.aspx>  
 WH selection for cut flow: <https://twiki.cern.ch/twiki/bin/view/AtlasProtected/WHNoteSummer2011>

**Recommendations for WH baseline**

**Differences wrt WH cut flow**

**Expected CP recommendations** for 2011

	<b>lvqq</b>	<b>llqq</b>	<b>W/Z common</b>	<b>WH-&gt;lvbb (cut flow)</b>	<b>Proposal for WH</b>	<b>Obs</b>
<b>Muon Selection</b>						
finder	Staco combined or MuTag	Staco combined or MuTag	Staco	Muid	Muid + segment tags	Investigate MuTag and Staco later
pT	> 20 GeV	> 20 GeV	> 20 GeV	> 20 GeV	> 20 GeV	may need to go to 22GeV - study trigger
eta	< 2.4	< 2.5	< 2.4	< 2.5	< 2.4	muon trigger coverage
MCP quality cuts	yes	yes	yes	yes	yes	
z0 wrt PV	< 10mm	< 10mm	< 10mm	< 10mm	< 10mm	
d0 wrt PV	< 1mm	< 1mm	< 1mm	< 1mm	< 1mm	study later?
isolation	pT(calor)20<1.8GeV	pT(trk)20<1.8GeV	pTTrk20/pT<0.1	pT(trk)20<1.8GeV	pTTrk20/pT<0.1	But study effect of different approaches
<b>Electron selection</b>						
author	1 or 3	1 or 3	1 or 3	1 or 3	1 or 3	
PID	RobusterTight	RobustMedium	Med/Tight_withTrackMatch	Tight_withTrackMatch	Tight_withTrackMatch	Investigate alternatives later
pTcluster	> 20 GeV	> 20 GeV	> 20 GeV	> 20 GeV	> 20 GeV	may need to go to 22GeV - study trigger
eta	< 2.47 excl. crack	< 2.5 incl. cracks	< 2.47 excl. crack	< 2.5 excl. crack	< 2.47 incl. crack	But check effect of crack in study the crack after studies
isolation	etcone30<6GeV	NA	caloIso98 (what's this???)	NA	NA	This should be studied
b-layer hit	NA	NA	yes	NA	NA	Do we need b-layer hit cut?
z0 wrt PV	< 10mm	NA	NA	NA	NA	
d0 wrt PV	d0signif < 10	NA	< 0.1mm	NA	NA	But study effect of different approaches
<b>vertex</b>						
primary vertex	Nvtx>=1 & Ntrks>=3	Nvtx>=1 & Ntrks>=3	Nvtx>=1 & Ntrks>=3	Nvtx>=1 & Ntrks>=3	Nvtx>=1 & Ntrks>=3	Apply to first vertex
<b>MET</b>						
algorithm	MET_LocHadTopo( eta <4.5) + MET_MuonBoy-MET_RefMuonTrack	MET_LocHadTopo - Sum(pTmu - ETlossInCalo)	METRefFinal	MET_LocHadTopo - Sum(pTmu - ETlossInCalo)	METRefFinal	Investigate alternatives later
<b>Jet selection</b>						
finder	AntiKt4H1Topo	AntiKt4H1Topo	AntiKtTopo (0.4 priority)	AntiKt4Topo	AntiKt4Topo	Should check other options
pT	> 30GeV	> 25GeV	> 30GeV	> 25GeV	> 25GeV	Investigate alternatives later
scale	EM+JES	EM+JES	EM+JES	EM+JES	EM+JES	
calibration	H1	H1	?	?	?	Should check other options
eta	< 4.5	< 3.2	< 4.5	< 2.5	< 4.5	
jet vertex fraction	NA	< 0.75 wrt PV	NA	< 0.75 wrt PV	< 0.75 wrt PV	Investigate pileup - to be changed in 2 weeks
jet cleaning	Loose	Loose	Medium	Loose	Loose (for pTjet>20GeV and not MC)	Investigate alternatives later - use OffsetEtaJES tool to data only
<b>Overlap removal</b>						
jet-e	remove jet for dR<0.3	remove jet for dR<0.4	remove jet: dR<0.2(0.5 if pT>20)	remove jet for dR<0.4	remove jet for dR<0.4	Investigate alternatives later
mu-jet	NA	remove muon for dR<0.4	remove jet: dR<0.2(0.5 if pT>20)	remove muon for dR<0.4	NA	Investigate alternatives later
mu-e	remove electron for dR<0.1	NA	NA	remove muon for dR<0.4	NA	Not needed (2nd lepton veto)
<b>Event selection</b>						
trigger			(for 2011 data recluster jets)			Need to investigate trigger
event cleaning	jet/ETmiss recommendation	jet/ETmiss recommendation	jet/ETmiss recommendation	jet/ETmiss recommendation	jet/ETmiss recommendation	same as Jet cleaning
lepton	exactly 1 lepton	exactly 2 leptons same flavour	exactly 1 lepton	exactly 1 lepton	exactly 1 lepton as defined	
extra lepton veto e channel	veto robustMed. Electrons	opposite charge, veto otherwise	veto additional med.electrons	veto additional tight electrons	veto add. signal electrons	Investigate alternatives later
extra lepton veto mu channel	NA		veto add. combined muons	veto add. combined muons	veto add. signal muons	Investigate alternatives later
lepton pT additional cut	> 30GeV	NA	NA	NA	NA	
MET	> 30GeV	< 50GeV	> 25GeV	> 25GeV	> 25GeV	Investigate alternatives later
Njets	exactly 2 or 3	>=2	NA	>= 2	>=2	
b tag	b-tag veto (SV0>5.72)	NA	SV0>5.85,  eta <2.1, pT>30	IP3D+SV1 > 1.55	Investigate 1 and 2-tags	Start with IP3D+SV1>1.55, but check all possibilities
Additional cuts	m(jj) near mW &  eta(j) <2.8	70<m(jj)<105, 76<m(ll)<106, etc	NA	MT > 40 GeV	MT > 40 GeV	Investigate alternatives later