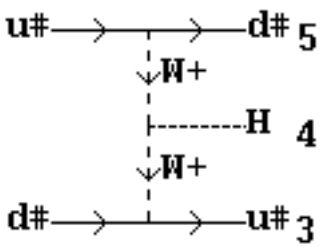
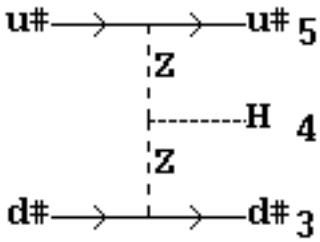
A. Nikitenko Imperial College, UK / ITEP Moscow

ORCA analysis of qq->qqH, H->WW*->2l, M_H=120 GeV

could be a discovery channel at the very beginning of LHC running





+ . . .

check with orca selection efficiency of cuts from

D. Zeppenfeld et al PL B 503 (2001) 113-120

optimized for light Higgs ~ 115-120 GeV search

(ME + smeared (ATLAS) detector)

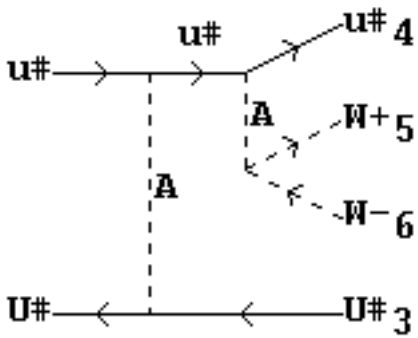
backgrounds to be estimated

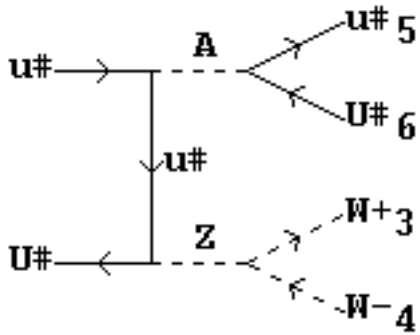
backgrounds for eμ + P_T^{miss} final state

tt->bbWW->2l (32 pb) in CERN will be done with pythia (as in ATLAS case)

QCD WW+2j, ττ + jj in CERN will be done with pythia (as in ATLAS case)

EW WW+2j, ττ + jj in CERN will be done with ME input from D.Z.
(Karl Jacobs provided ATLAS implementation code)



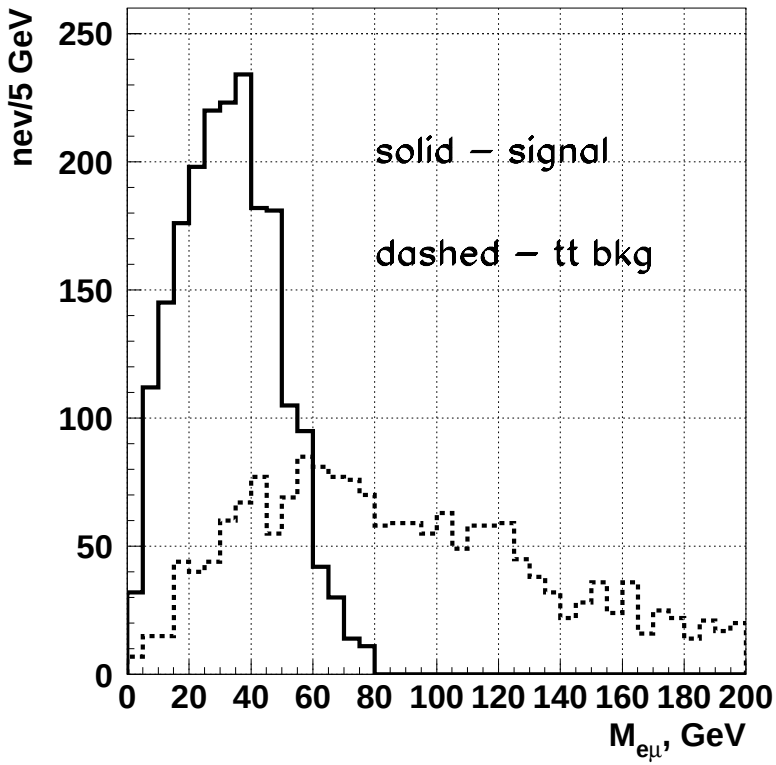


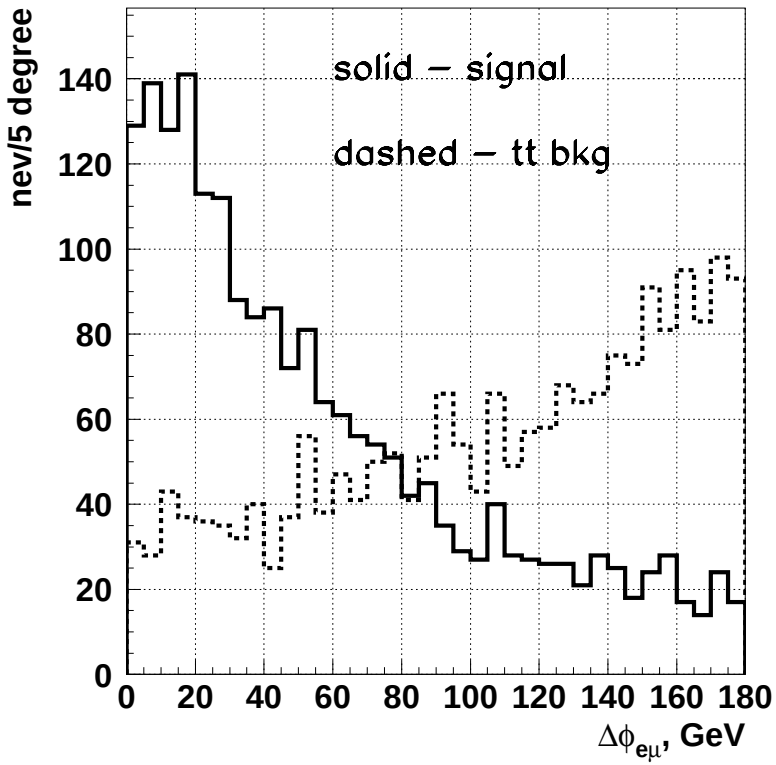
+ 1642 more diagrams . . .

backgrounds for ee μμ + P_T^{miss} final state

all bkg above + QCD /EW *ll* + jj & ZZ + jj

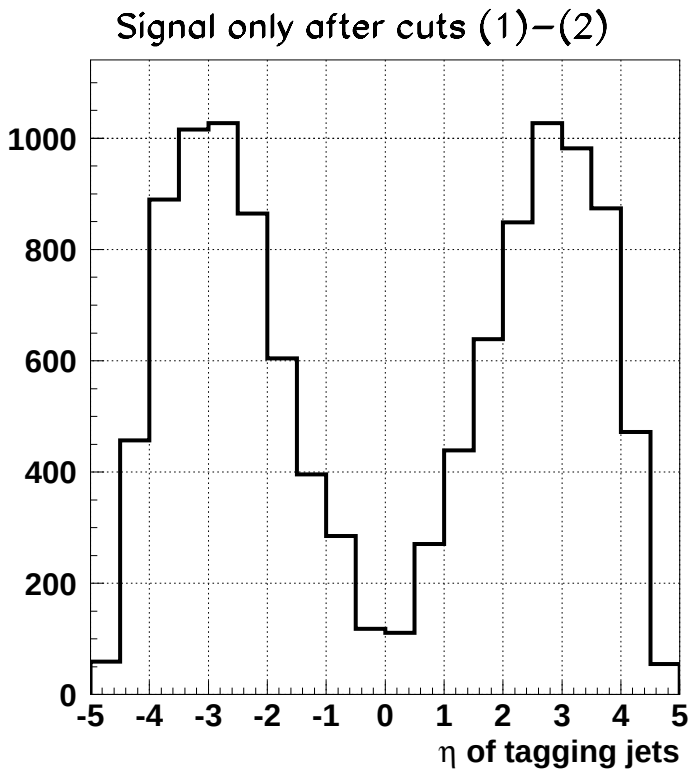
how to suppress 33 pb from tt->bbWW->2l ? (I)

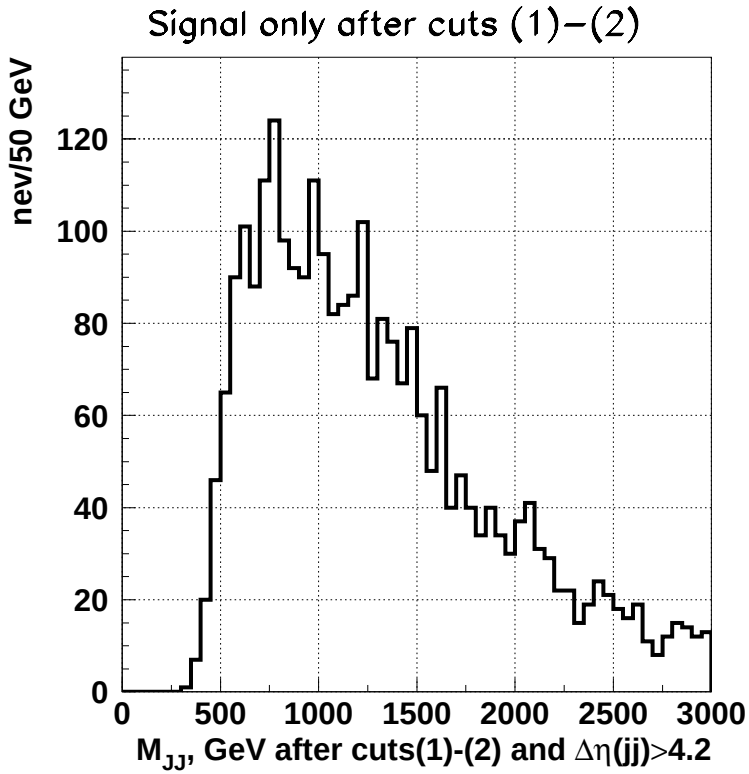




how to suppress 33 pb from tt->bbWW->2l ? (II)

Signal



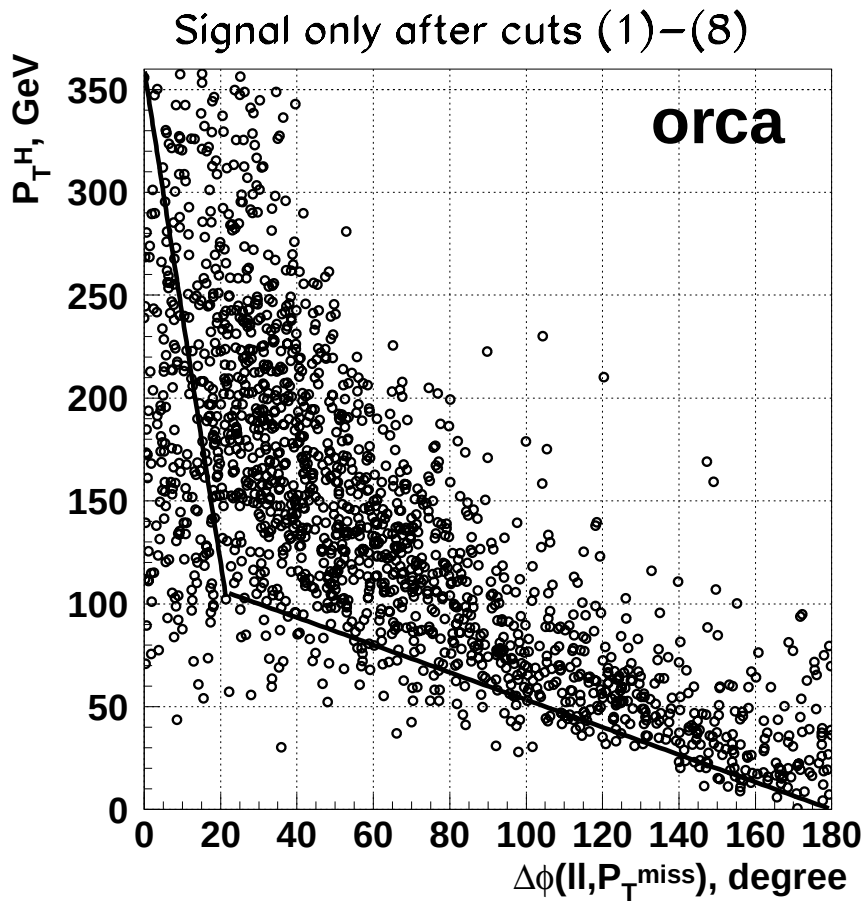


Jets from tt are central
- rapidity separation
- mini jet veto

M_{JJ} from tt is softer

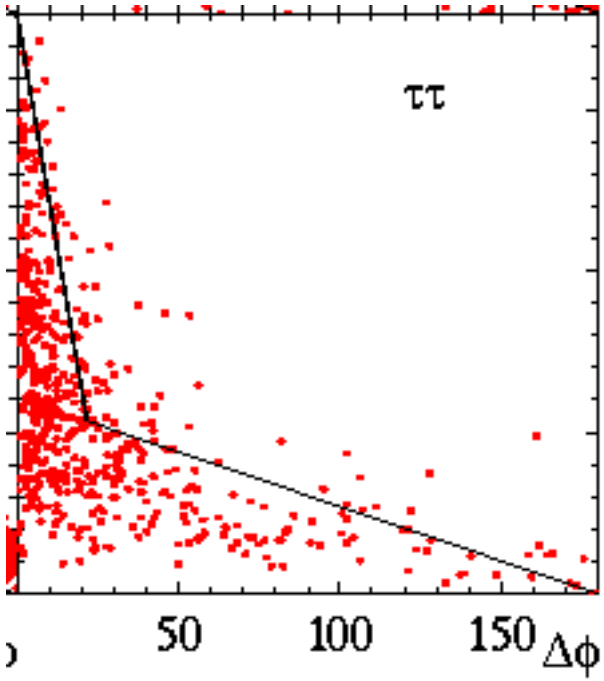
how to suppress $\tau\tau$ and bb ? (I)

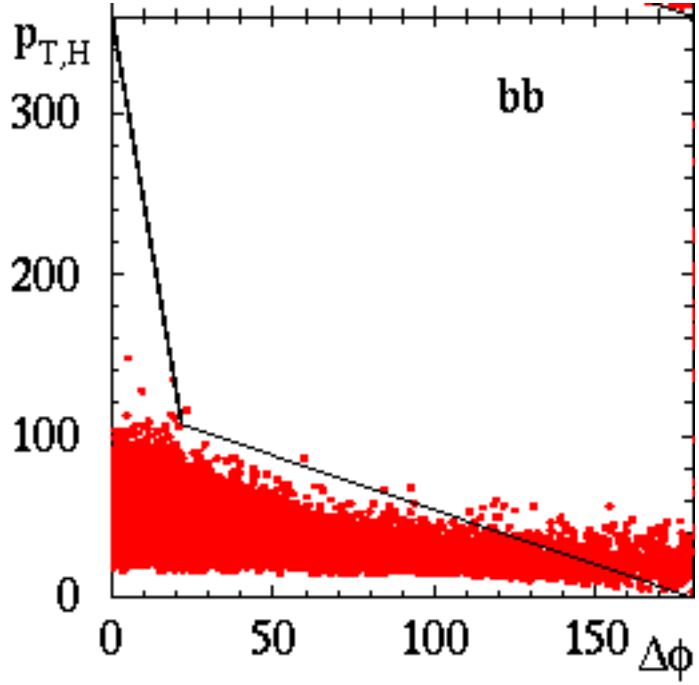
"contour cuts"



how to suppress $\tau\tau$ and bb ? (II)

"contour cuts" from D.Z et al paper





also veto events with $X_\tau > 0$ and $M_{\tau\tau} = M_Z$

comphep+pythia+orca analysis by A. N. v.s. ME+smeared detector by D. Zeppenfeld et ll

cuts are as in the paper D.Z. et al PL B 503 (2001) 113-120	σ, f b (A.N.)	σ, f b (D.Z)
cross-section qq->qqH, H->WW*-> e μ + P_T^{miss}	6.38	
(1) > 1 jet E_T^J>30 GeV, P_T^l>20,10 GeV, $\|\eta^l\|$ < 2.4, ΔR_{lJ} > 0.7	2.25	D.Z. E_T^J > 20 GeV
(2) η_J^{min} - 0.6 < η_{lept} < η_J^{max} - 0.6, $\eta_{J1} \times \eta_{J2}$ < 0	1.96	
(3) M_{JJ} > 600 GeV, $\|\eta_{J1} - \eta_{J2}\|$ > 4.2	1.66	
(4) no jets E_T > 30 GeV with η_J^{min} - 0.6 < η_J < η_J^{max} - 0.6	1.64	D.Z. E_T^J > 20 GeV
(5) m_{ll} < 60 GeV, ϕ_{ll} < 140 ^{0}	1.49	
(6) veto on $X_{\tau 1}$ > 0, $X_{\tau 2}$ > 0, $\|M_{\tau\tau} - M_Z\|$ < 25 GeV	1.32	
(7-8) 50 GeV < M_T (WW) < M_H + 20 GeV (140 GeV)	1.12	1.65
(9) $\Delta\phi$(l l, P_T^{miss}) + 1.5 P_T^H > 180^0 and 12 $\Delta\phi$(l l, P_T^{miss}) + P_T^H > 360 ^{0}	0.96	1.48
(10) P_T^{miss} > 20 GeV if P_T^H < 50 GeV (against bb)	0.95	1.46 x 0.89=1.30
(11) m_{ll} > 10 GeV, P_T^{miss} > 30 GeV for ee, μμ analysis	0.81	0.92

not too much different !

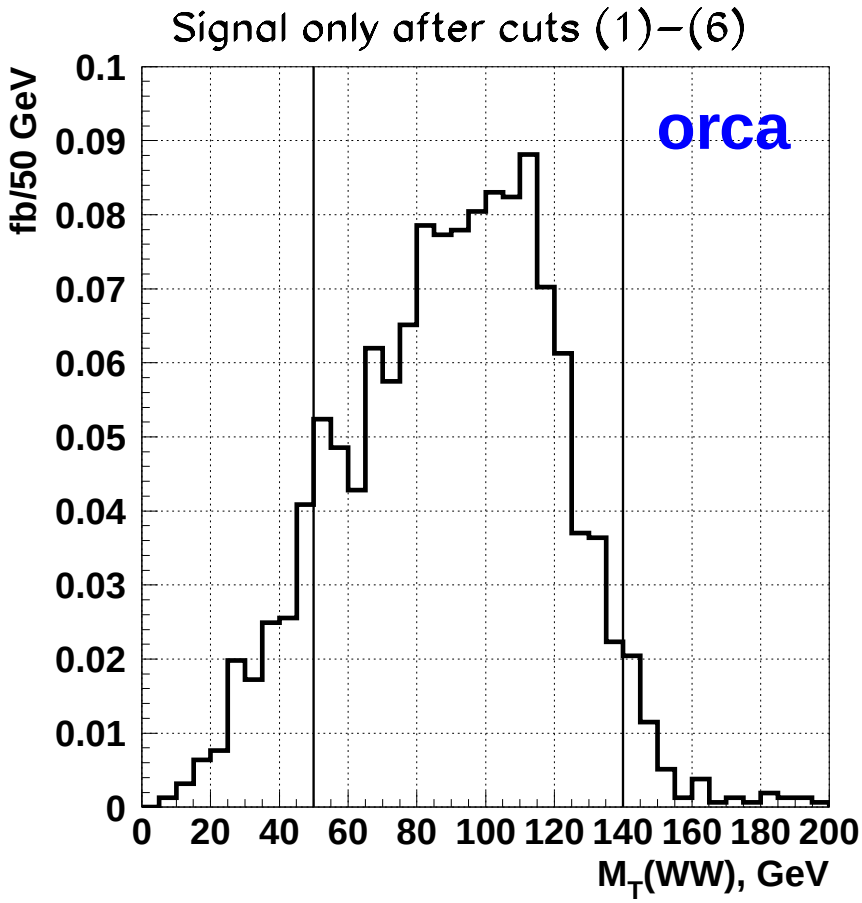
M_T(WW) reconstruction

$$M_T(WW) = \left((E_T^{miss} + E_T^{ll})^2 - (P_T^{miss} + P_T^{ll})^2 \right)^{1/2}$$

two (virtual) W's are almost at the rest in the Higgs frame =>

l and ν are ~ back-to-back

$$m_{ll} \sim= m_{\nu\nu}$$

$$E_T^{ll} = \left((P_{T\,ll}^2 + m_{ll}^2) \right)^{1/2}$$

$$E_T^{miss} = \left((P_T^{miss\,2} + m_{ll}^2) \right)^{1/2}$$