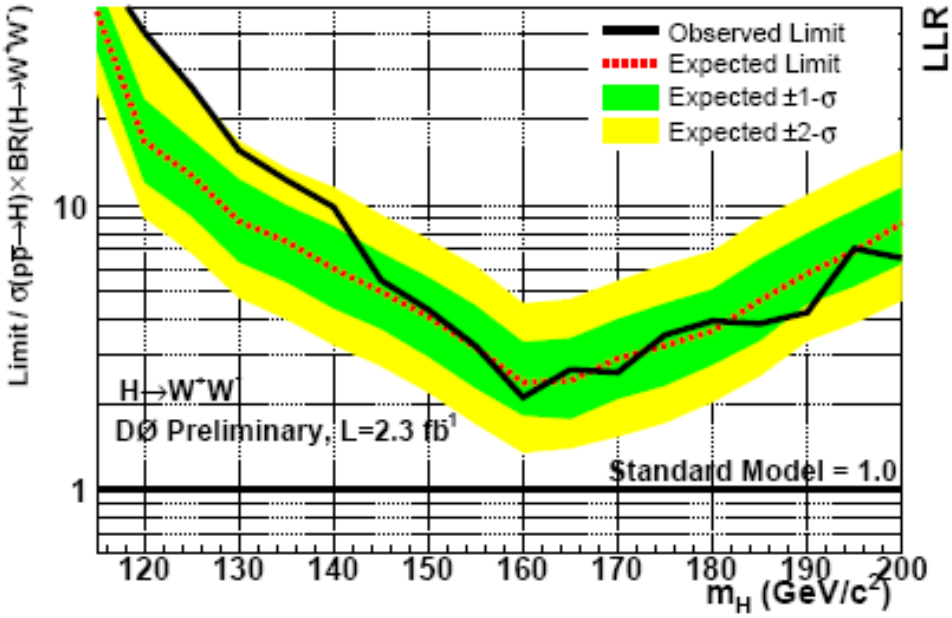
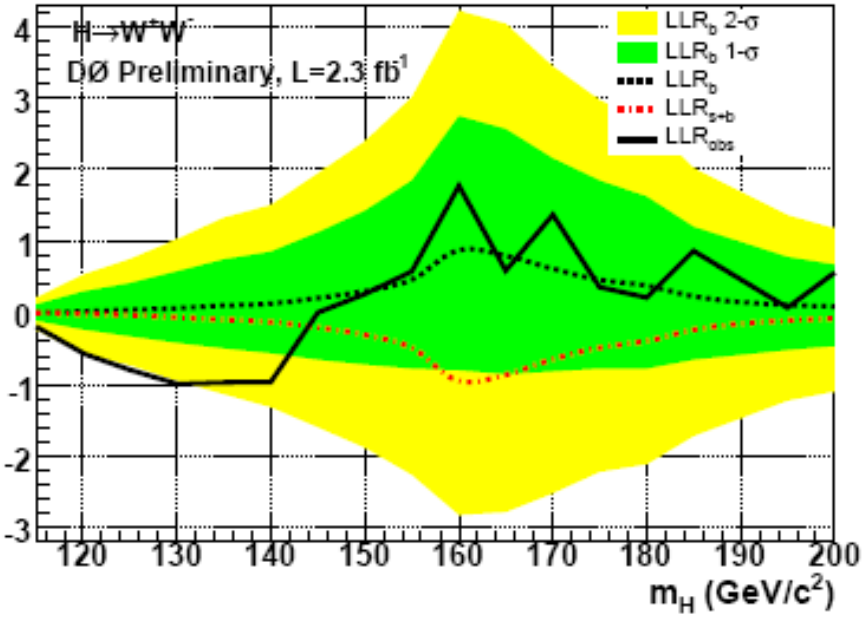
H->WW

H->WW->mumu p20 and ee,emu,mumu p17/p20 combination approved in time for Moriond QCD '08

(Tevatron combo too : 1.1x SM obs. (1.6 exp.))





No major surprises – but a 2sig excess around mH=125 (fourth chiral generation?)

H->WW

mumu was more sensitive at low mH

Differences:

- lower lepton pT cuts (10,10 vs. 20,15)
- other cuts also lower (MTmin)
- different NN code
- more NN variables (SET,HTall,METsig, lepton isolation, quality)
- jets have to fake muons vs. electrons

Do tests in mumu analysis to see what is making a large impact

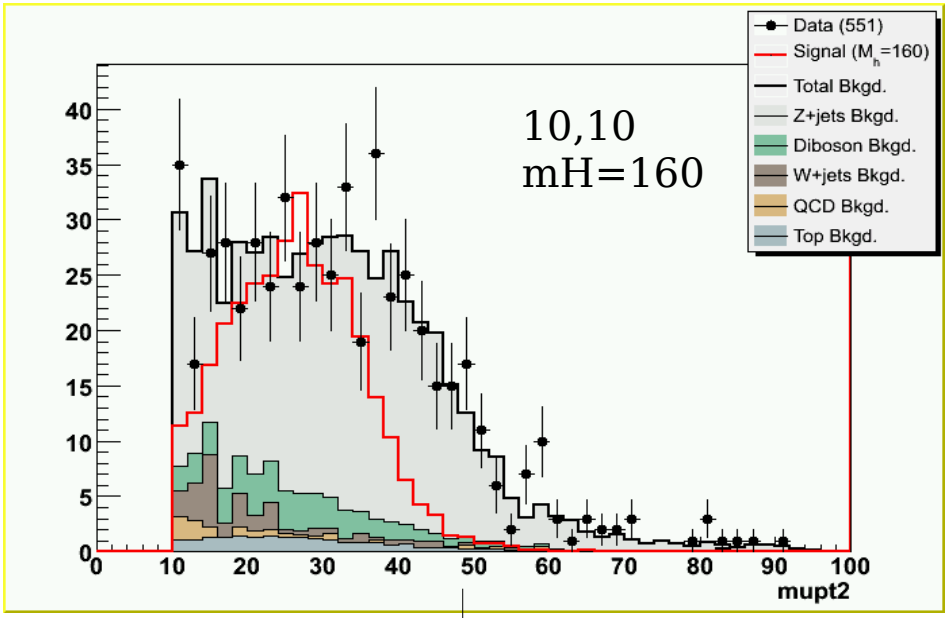
m_H=	120	160
$e\mu$ (exp.)	43.62	5.11
$e\mu$ (obs.)	41.02	3.84
ee (exp.)	70.72	8.20
ee (obs.)	109.91	12.85
$\mu\mu$ (exp.)	33.80	7.63
$\mu\mu$ (obs.)	66.22	7.48
All (exp.)	23.53	3.54
All (obs.)	44.3	3.53
Run IIa (exp.)	25.73	3.40
Run IIa (obs.)	49.62	2.97
Run II (exp.)	16.85	2.39
Run II (obs.)	40.77	2.12

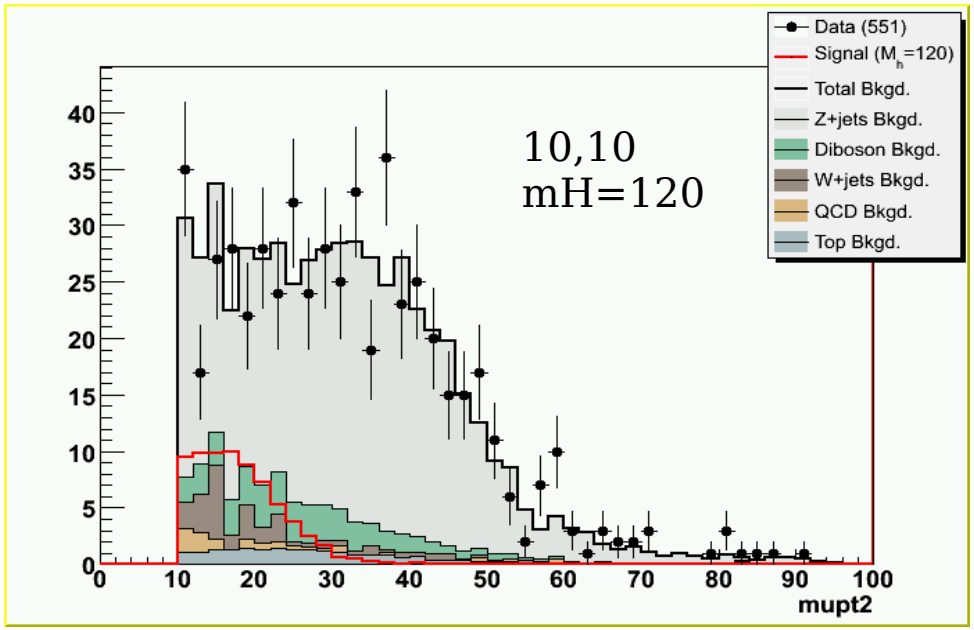
Higher pT cuts

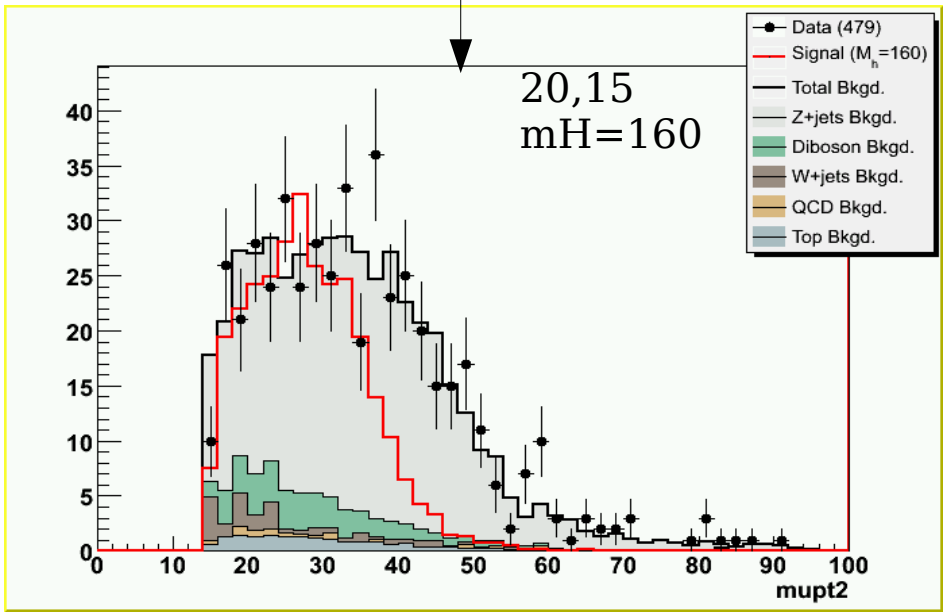
Perform tests with the p20 mumu H->WW analysis

Raise pT cuts to 20,15 on leading, second-leading muons (from 10,10)

Test change in NN performance



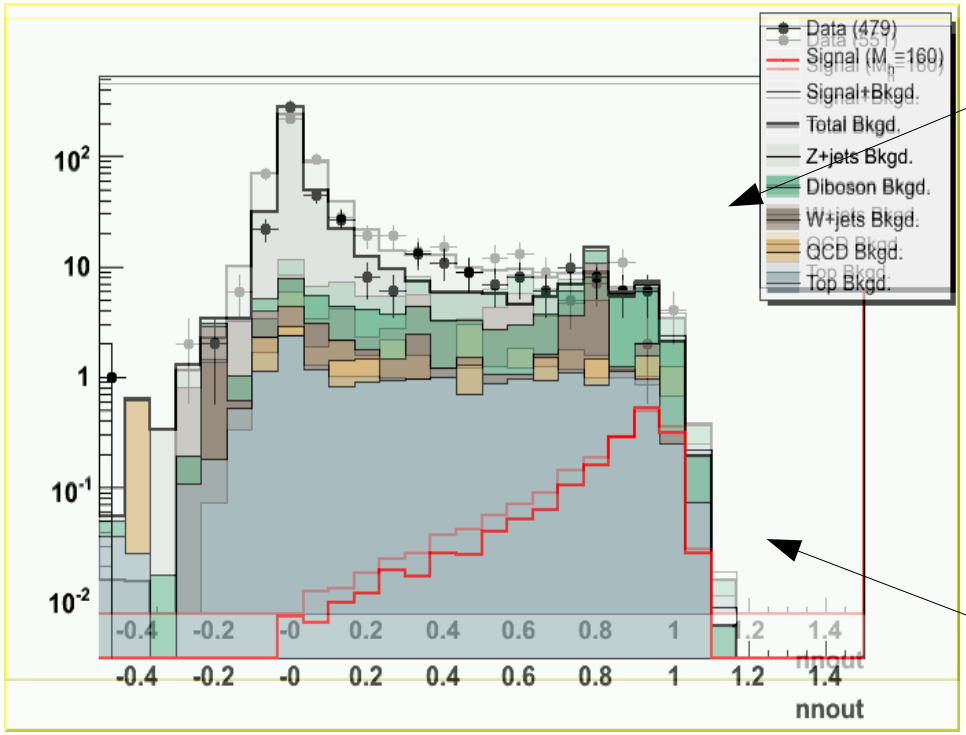


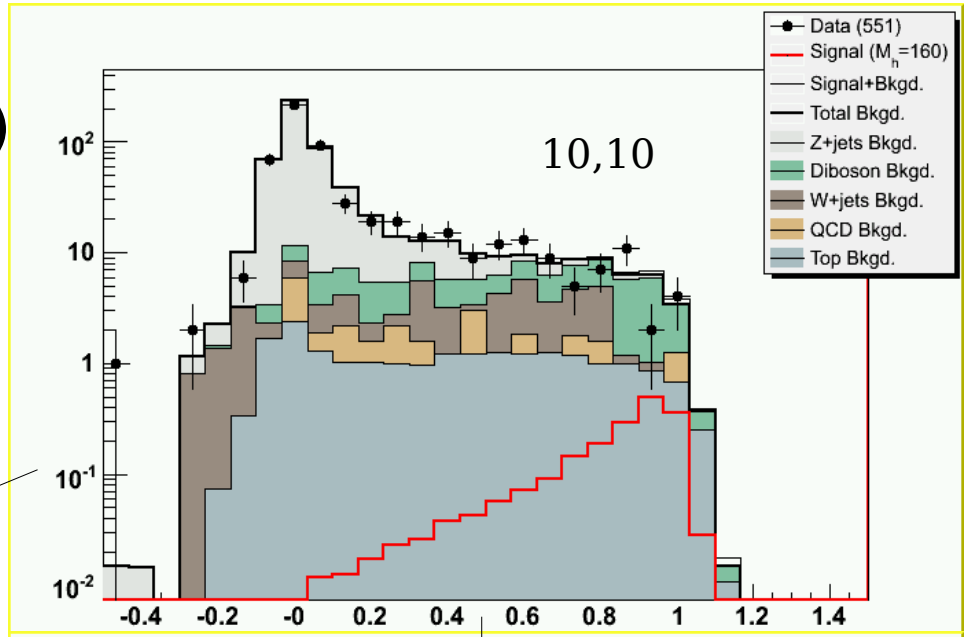


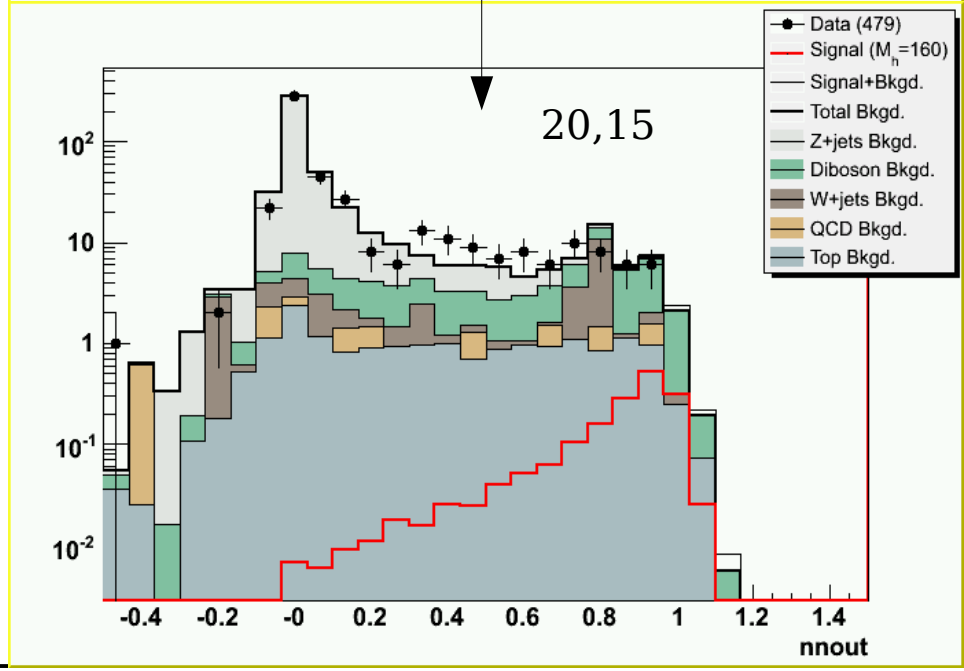
Higher pT cuts

Retrain NN's for new cuts (20,15)

These plots are all for mH=160

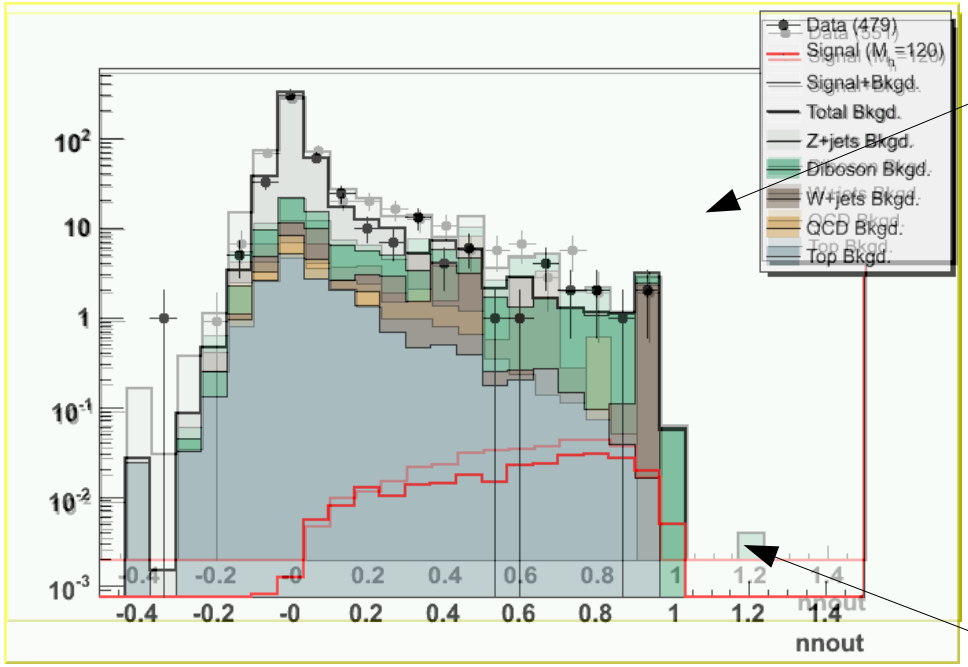


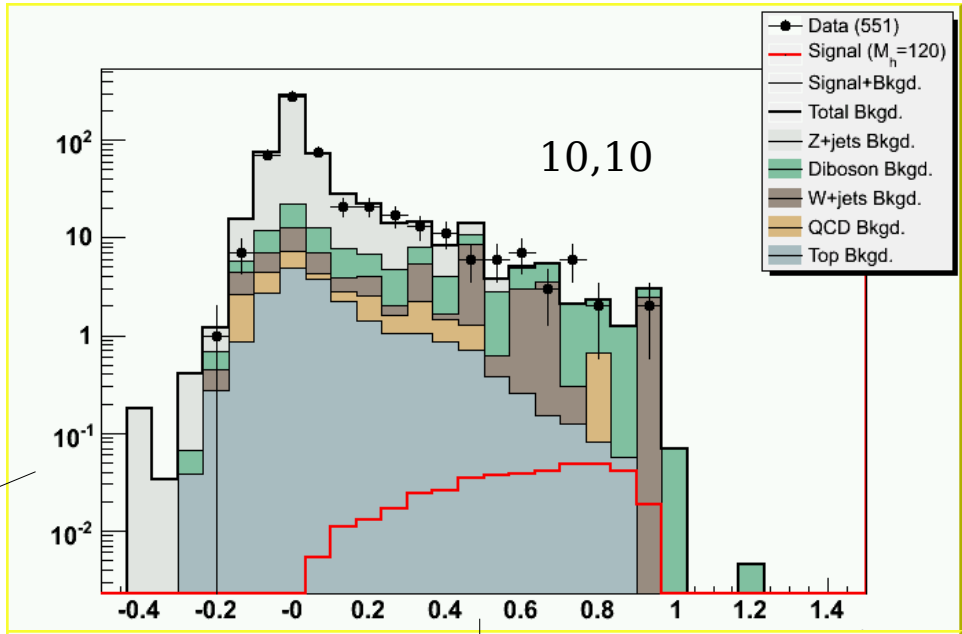


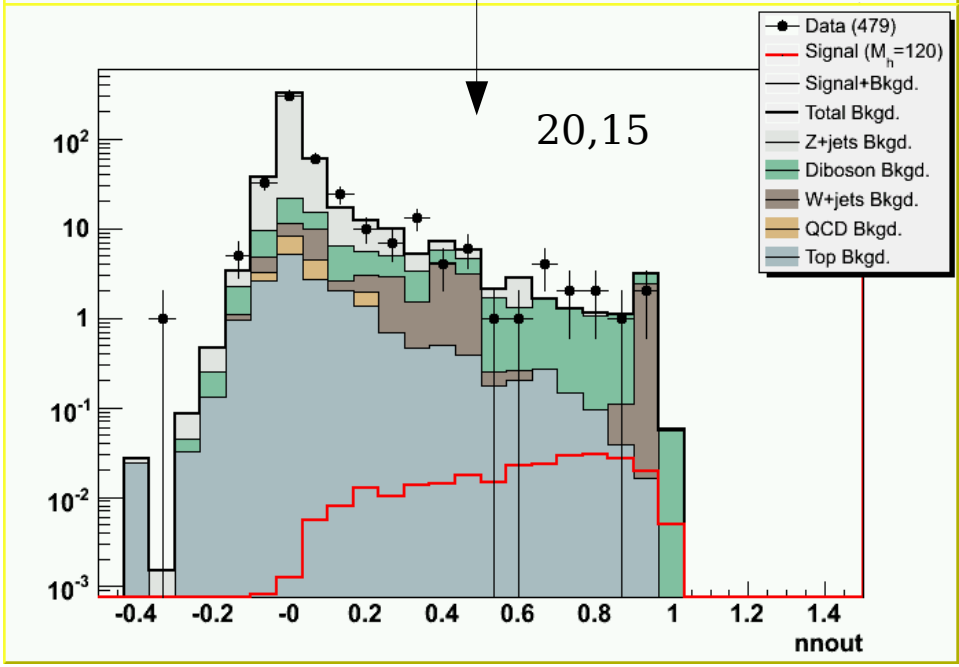


Higher pT cuts (TEST ONLY!)

These plots are all for mH=120







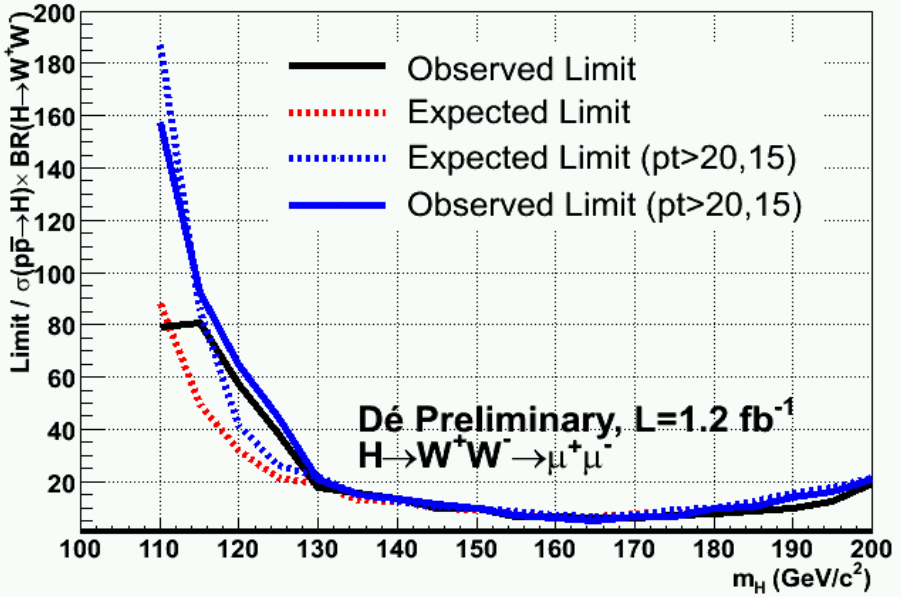
Higher pT cuts (TEST ONLY!)

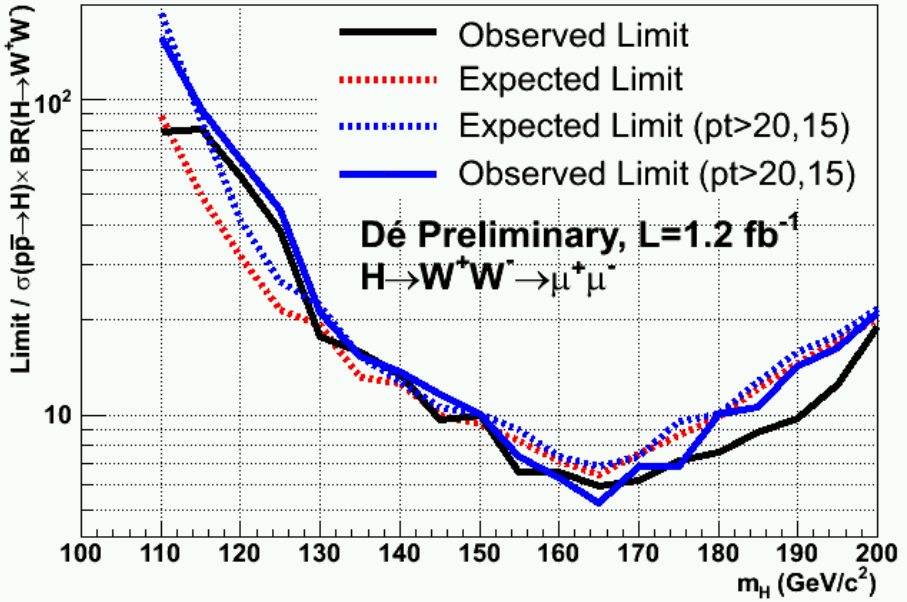
Set limits using COLLIE (no systematics, CLfast)

Significant improvement at low mH in exp. limit using 10,10 cuts (factor of ~2 at mH=110)

Not much difference at higher mH (>~130), but 10,10 still always a slightly better exp. limit

Not allowed to look at obs. limits!

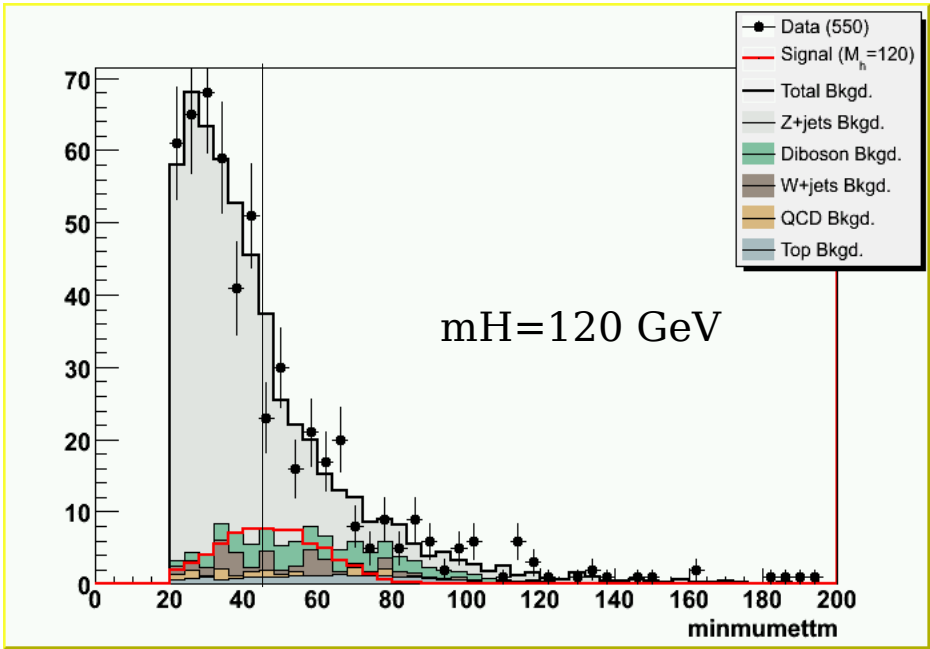


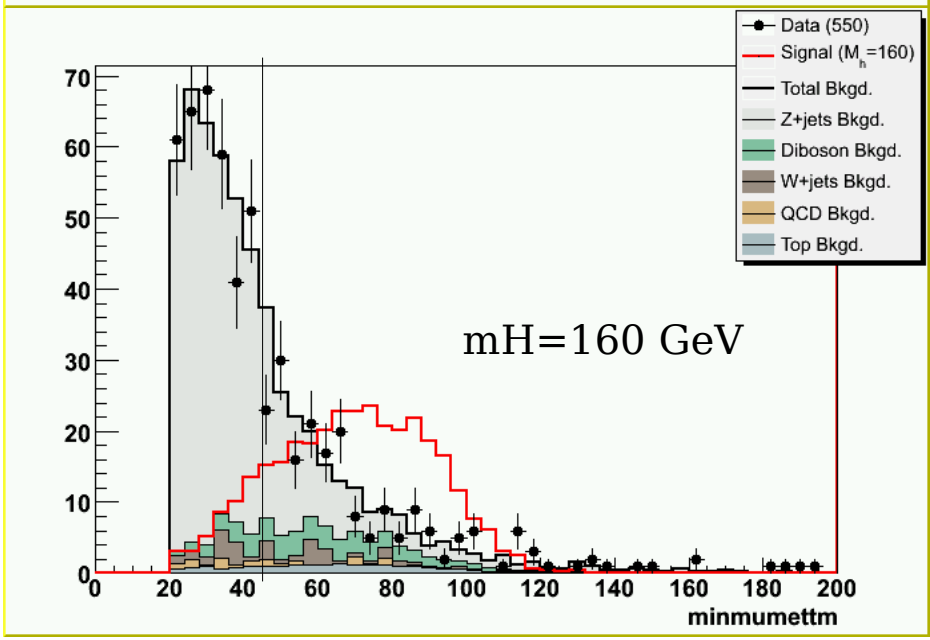


Higher MinTM cut (TEST ONLY!)

Raise Min Trans. Mass (mu, MET) cut from 20 to 45 GeV

(It was at 45 GeV for some points for the ee analysis.)





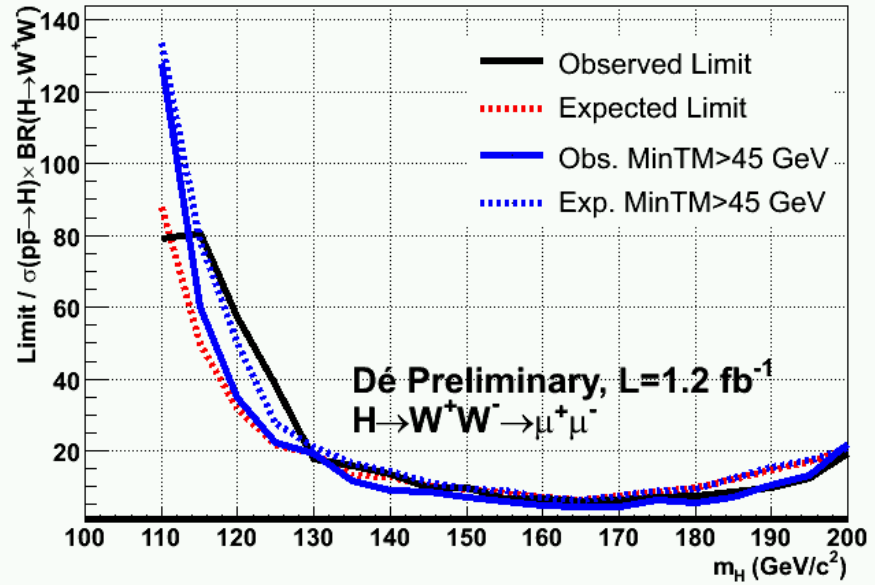
Higher MinTM cut (TEST ONLY!)

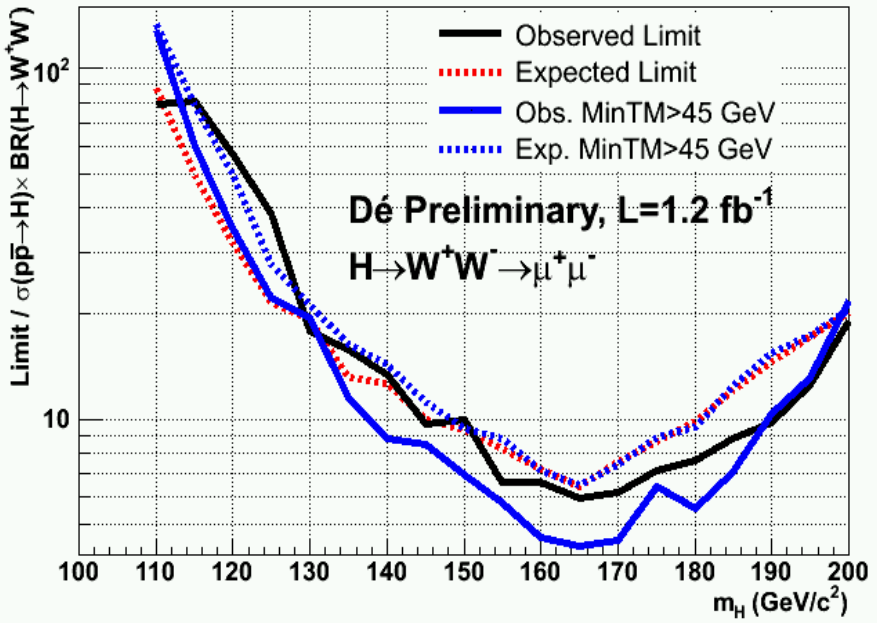
Retrain NN's for each mH

Set limits using COLLIE
(no systematics, CLfast)

Able to retain same or better performance at all mH

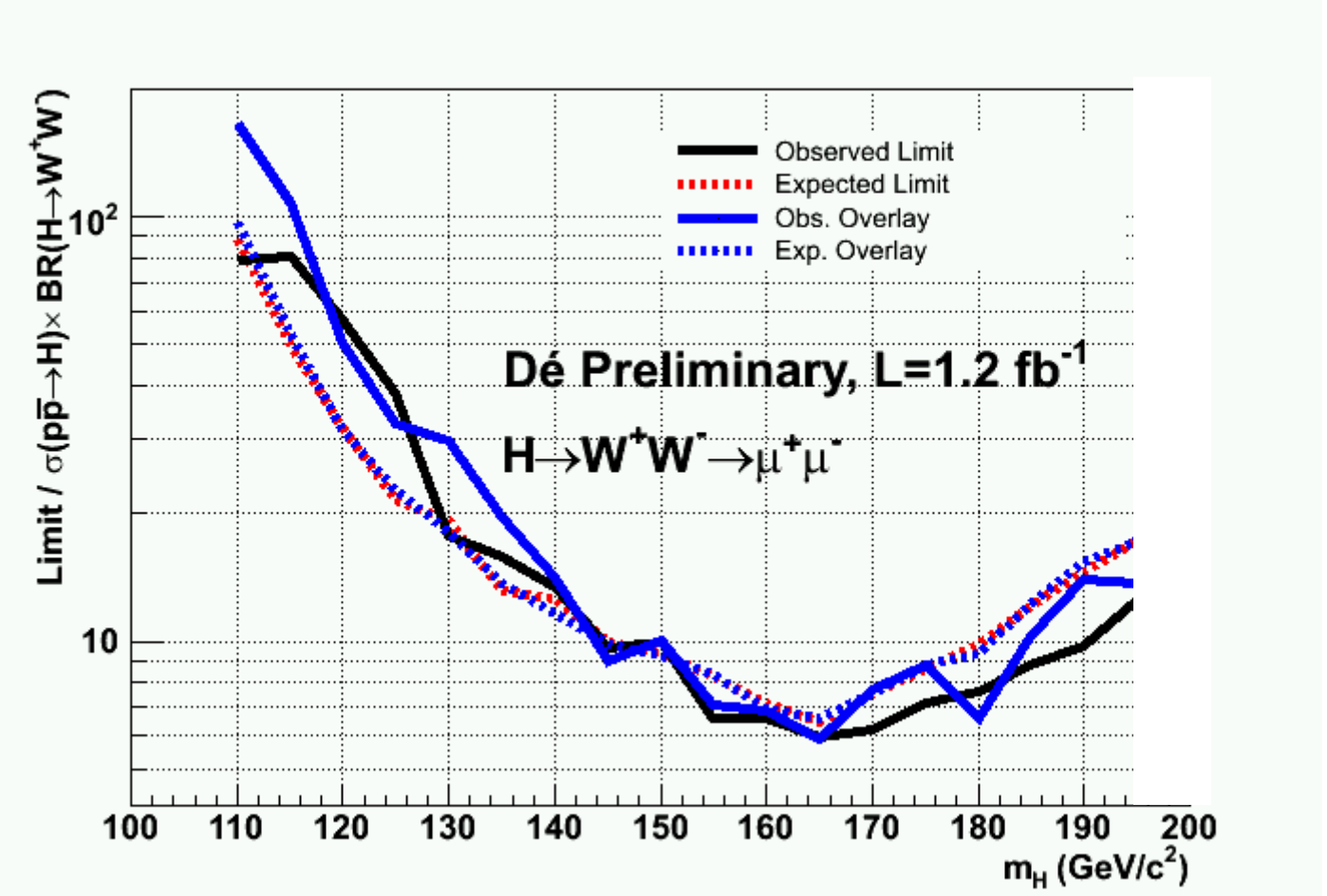
Conclusion:
lower cuts are *always* better
(assuming you understand the data/MC agreement)
(no systematics)





Other NN's

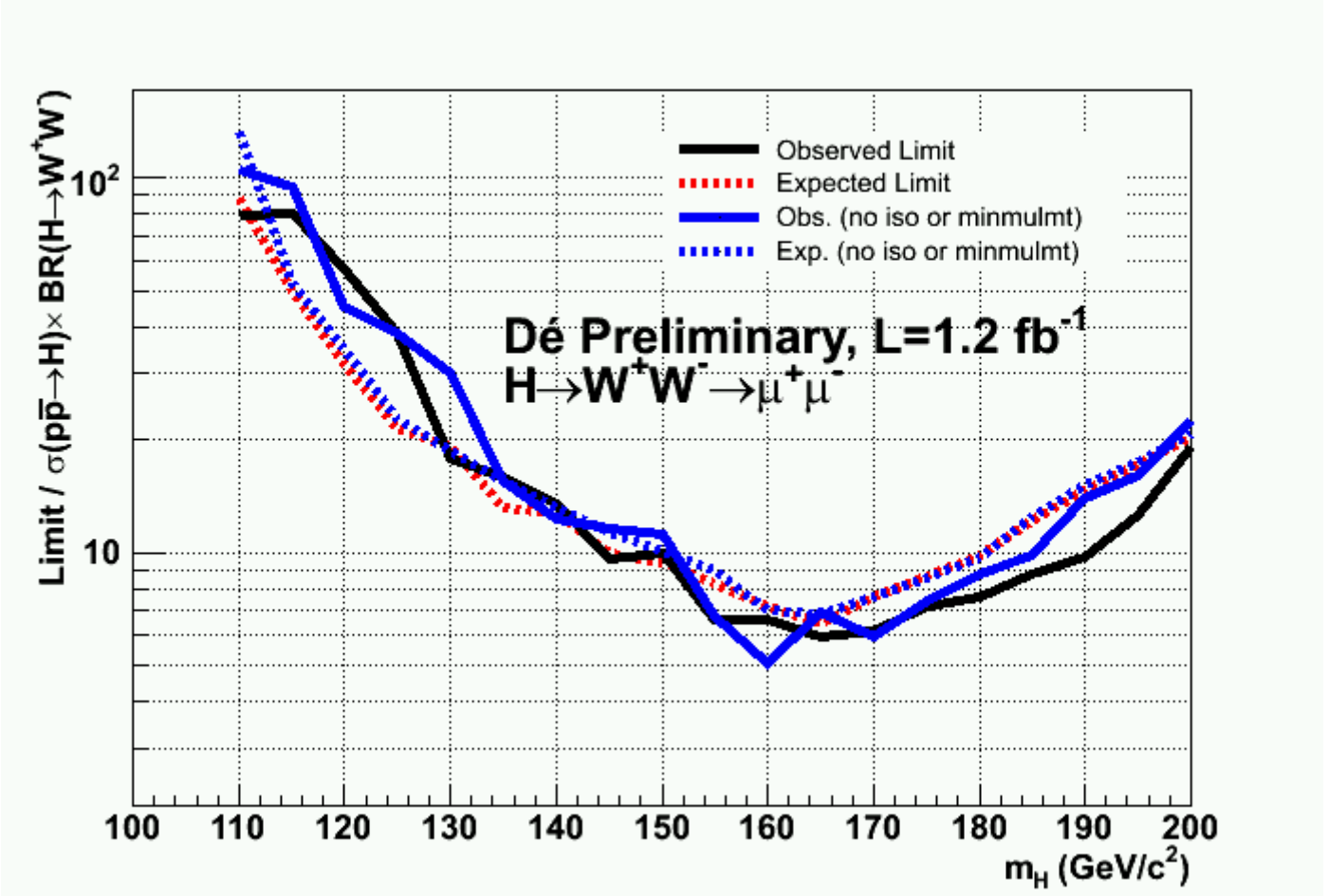
Remove isolation variable



Not much effect on sensitivity

Other NN's

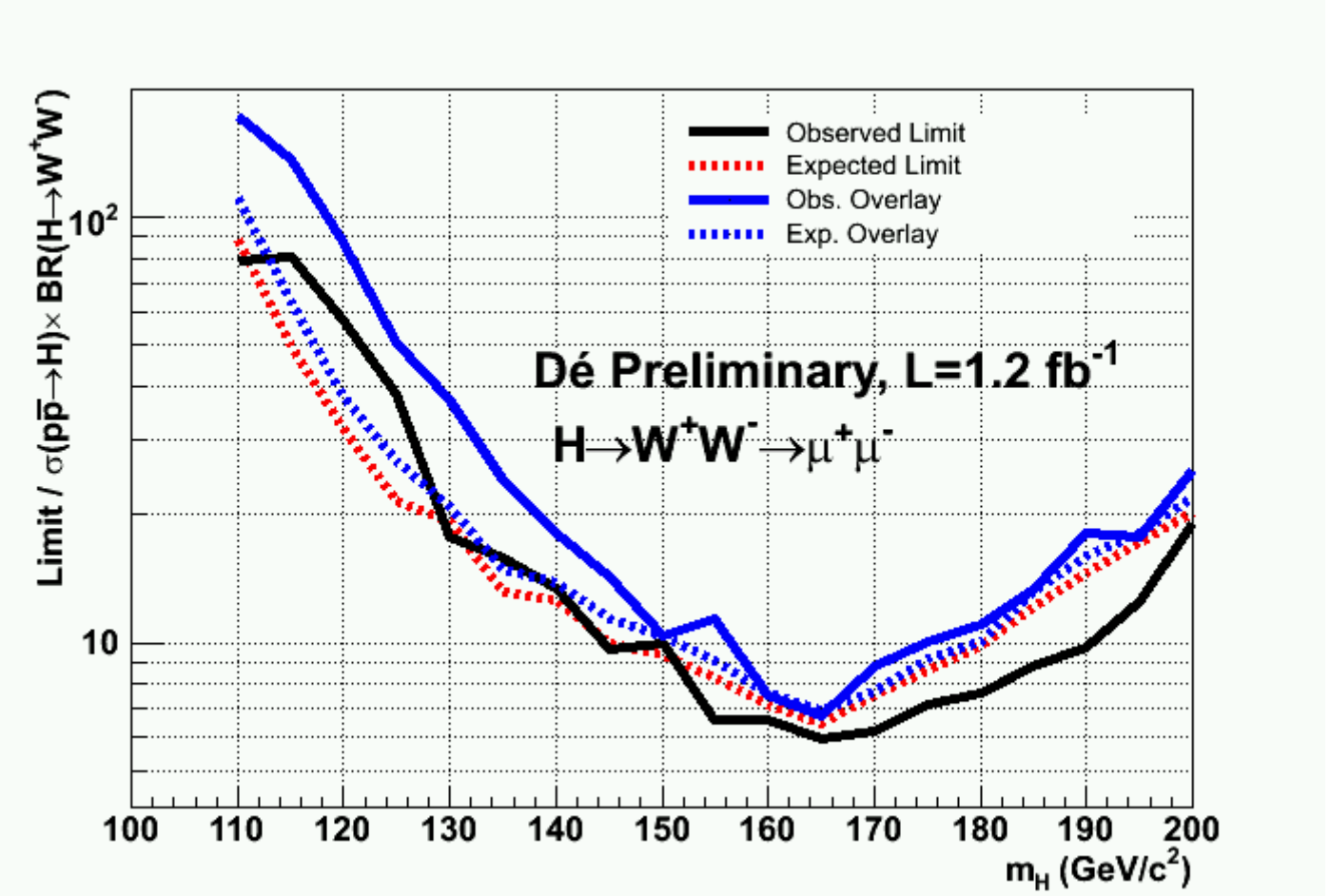
Remove isolation and muon quality variables



Maybe 5% difference at low mH

Other NN's

Remove METsig, HTall, and SET variables too



10-20% gain, even at mH=160

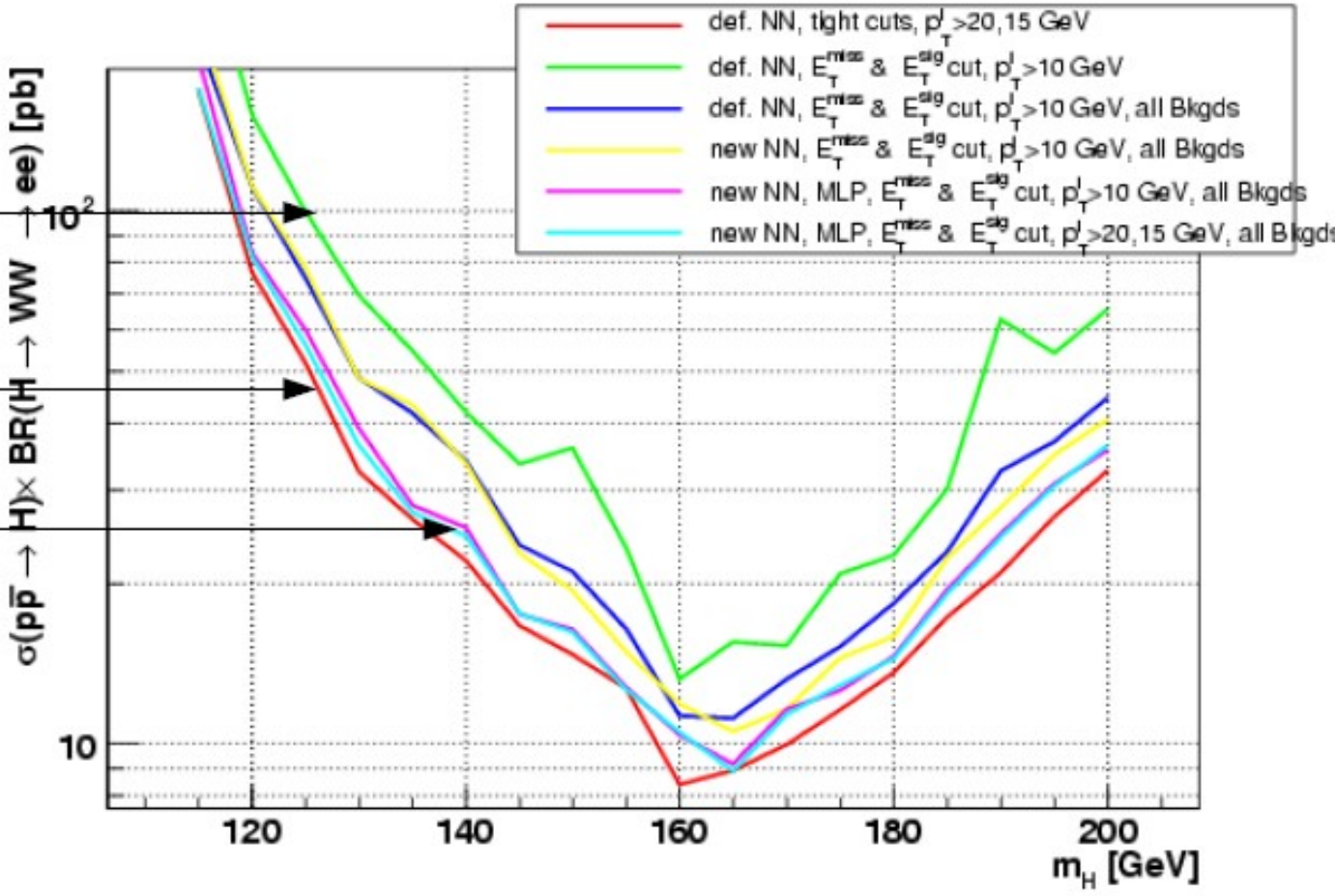
New ee Studies

Bjoern can now run my NN code on ee channel, and train against all (weighted) backgrounds

Training only against WW and Wenu as in note

Cuts/NN as in note

Reaching almost same performance new training (mlp, all bkgd)



My NN (MLP) does about as well as the hand-placed tight cuts!
No improvement with lower pT cuts yet – bug found in ee skim.