Higgs to WW:
TMVA NN Analysis: Full Status

Doug Benjamin, Mircea Coca, Dean Andrew Hidas,
Valentin Necula, Mark C. Kruse
Duke University/CDF

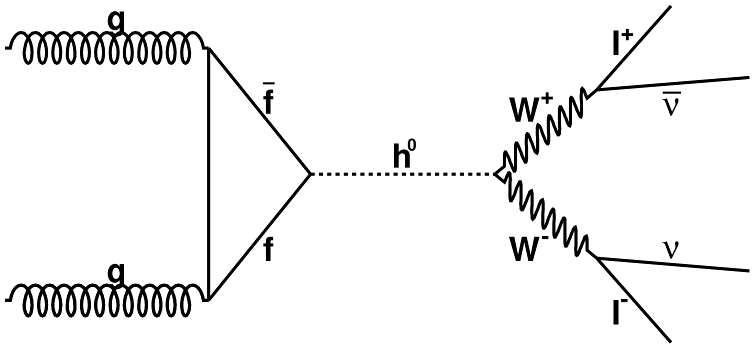
Peter Bussey, Toby Davies, Aidan Robson,
Richard St. Denis, Stan Thompson
University of Glasgow/CDF

18 Jul 2007

Overview

- Changes since 1fb analysis
- Cross-sections
- Input Variables

Recap of the Analysis



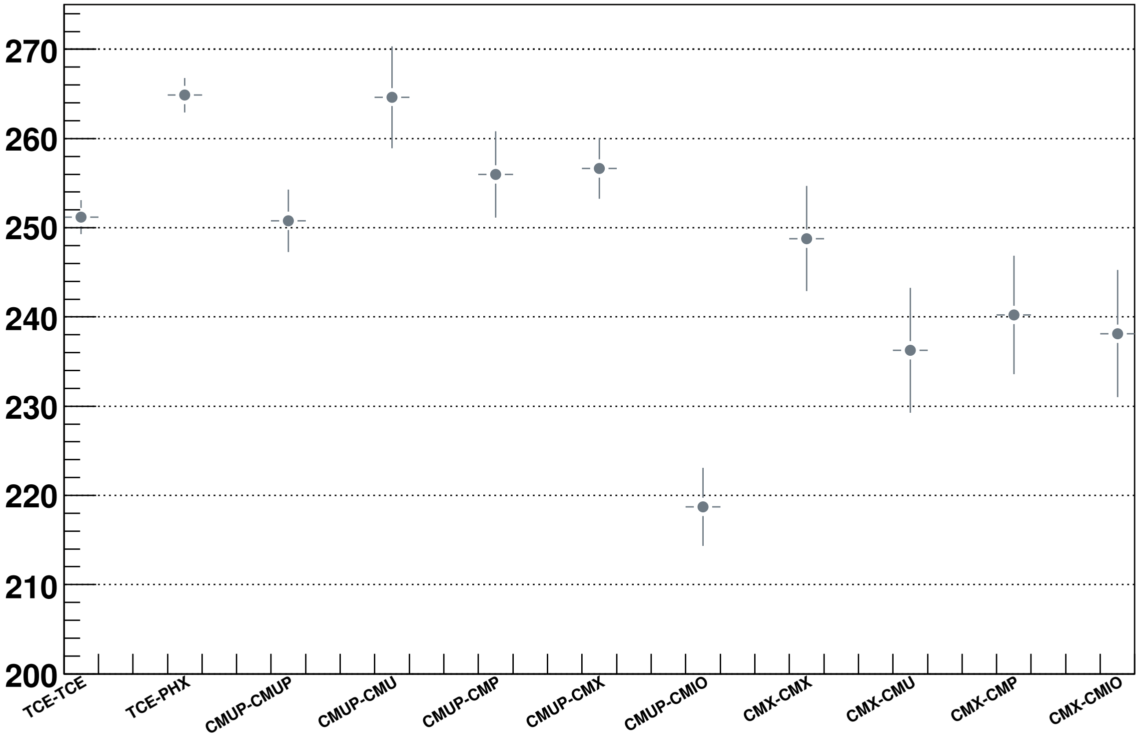
- Neural nets are used to discriminate backgrounds of Drell Yan and WW from H→WW signal
- Each net was trained at each mass for ee, $e\mu$ and $\mu\mu$ channels separately
- To reject the Drell Yan background, a cut was placed on the Drell Yan Neural Net (DYNN cut)

Changes Since the 1fb analysis

- data increased up to run 236132, 1.692^{fb}
- bug in stereo layer hit cut in lepton selection fixed
- CMX prescale fix included, a factor of 0.989 for all MC
- New DY generated at 5GeV (??) update this!!

Z$\rightarrow \ell\ell$ cross-sections

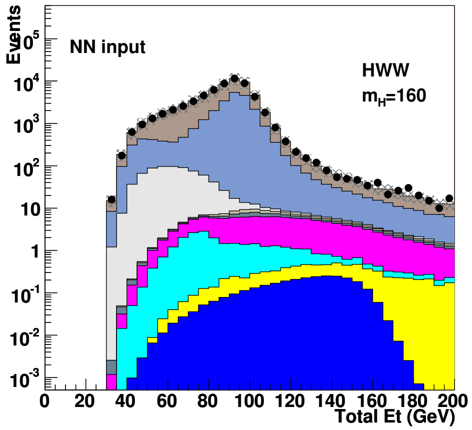
- New Drell Yan samples have low CMIO in the 0d runrange due to Gen5 data vs Gen6 MC
- CMX are also lower in prescaled and non-prescled data

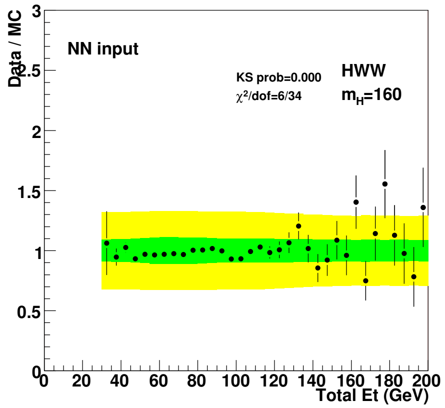


Legend

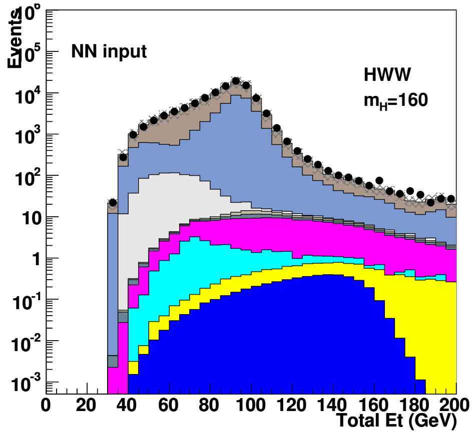
Five most separated plots M_H=160: total Et

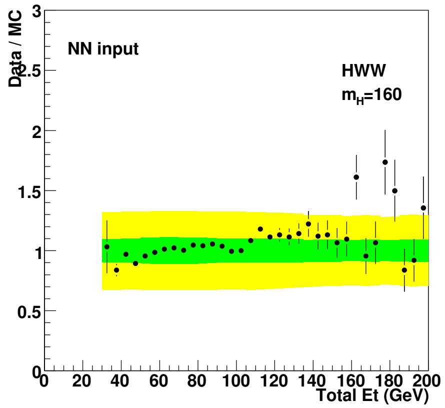
8700





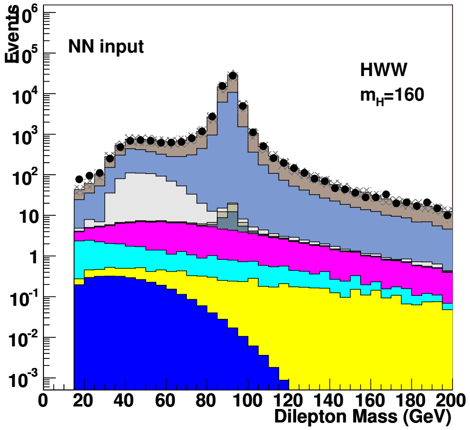
now



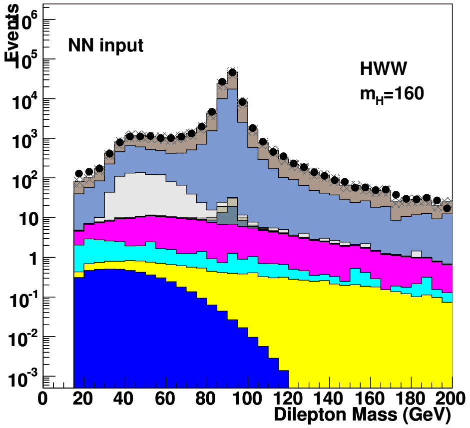


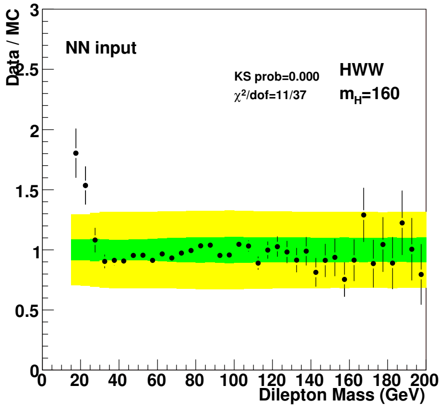
Five most separated plots M_H=160: dilepton mass

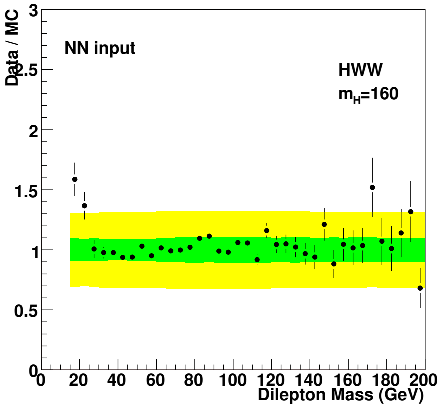
8700



now

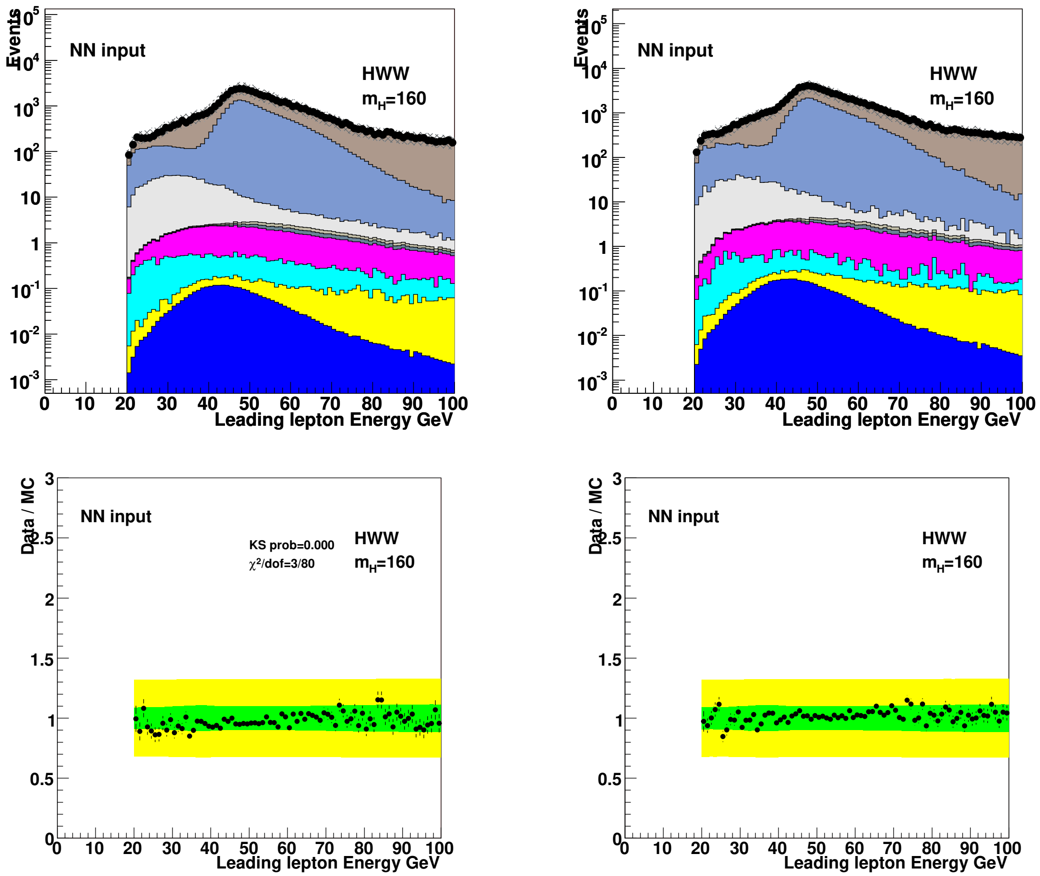






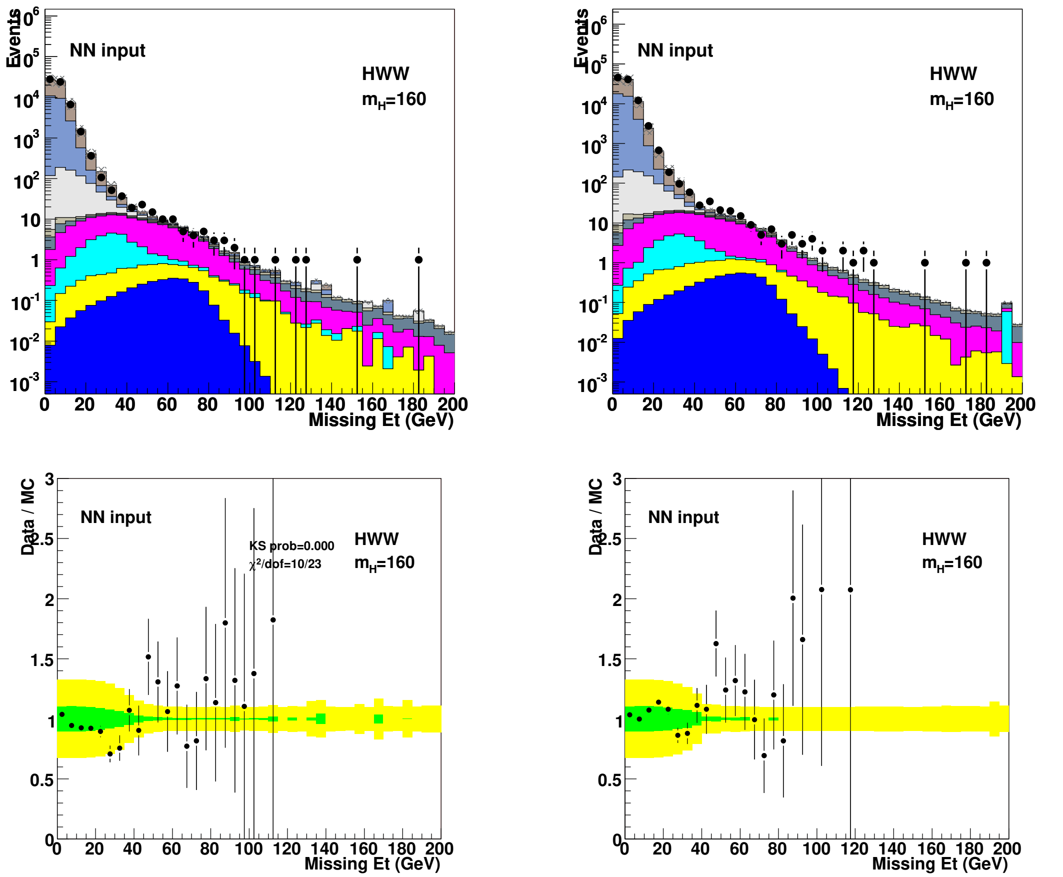
Five most separated plots M_H=160: first lepton Et

8700 now



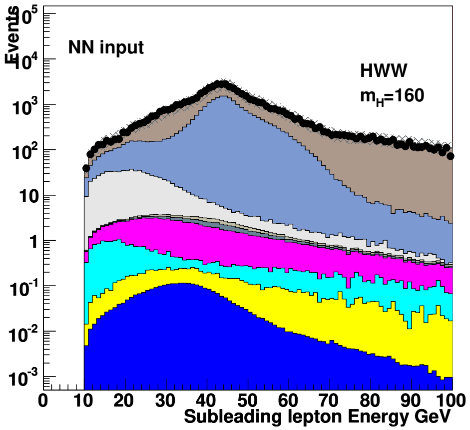
Five most separated plots M_H=160: Missing Et

8700 now

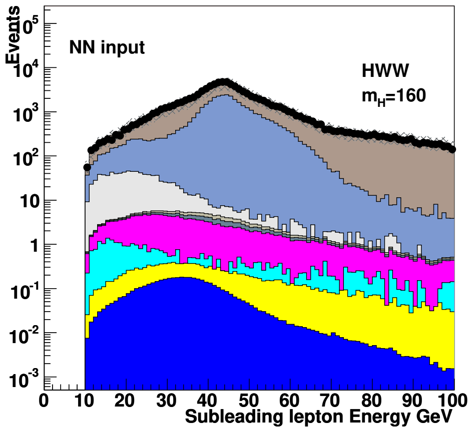


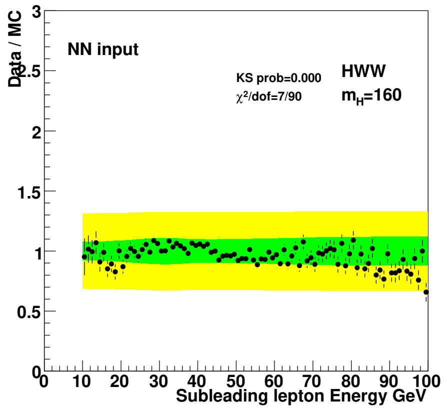
Five most separated plots M_H=160: second lepton Et

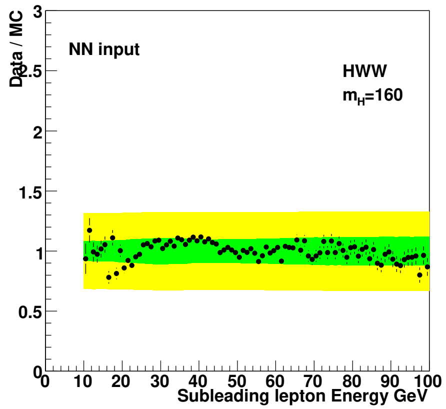
8700



now



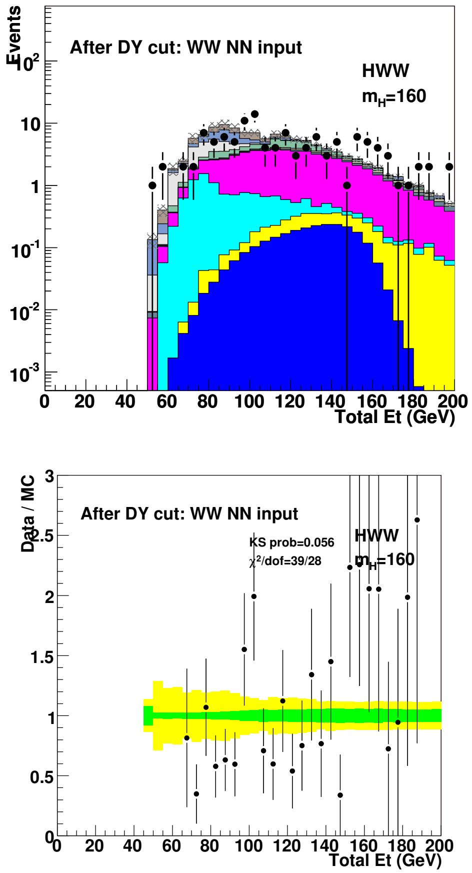




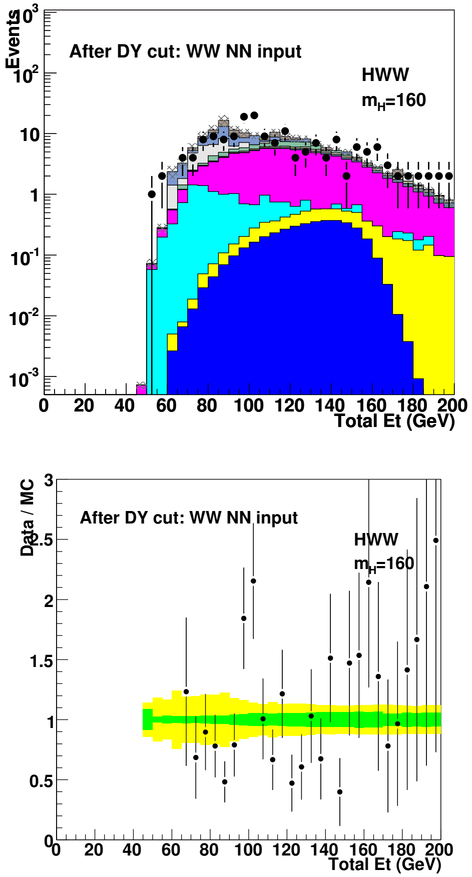
Five most separated plots after DY cut

M_H=160: total Et

8700



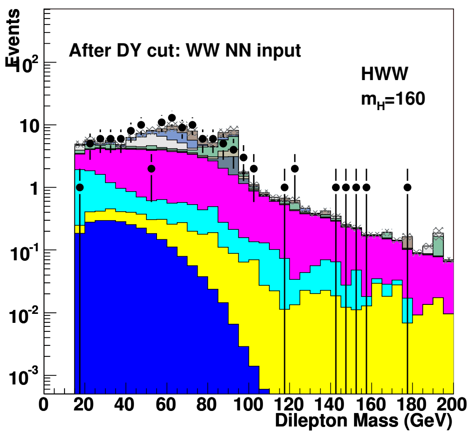
now



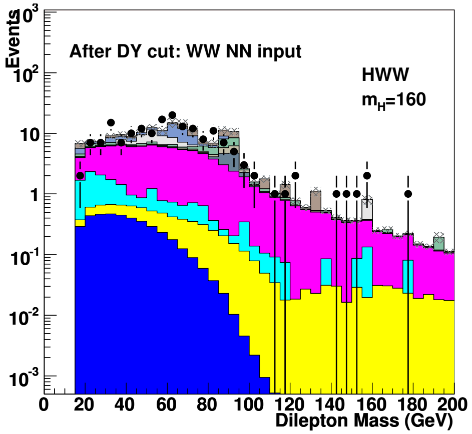
Five most separated plots after DY cut

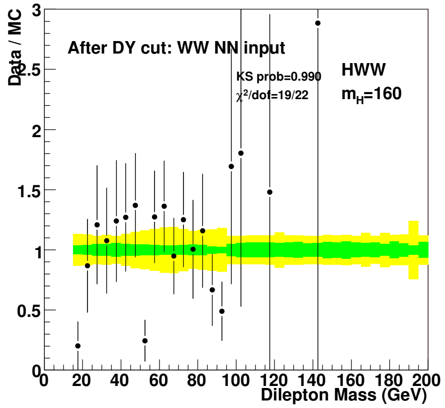
M_H=160: dilepton mass

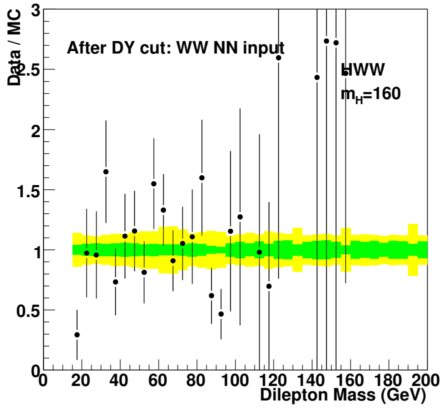
8700



now



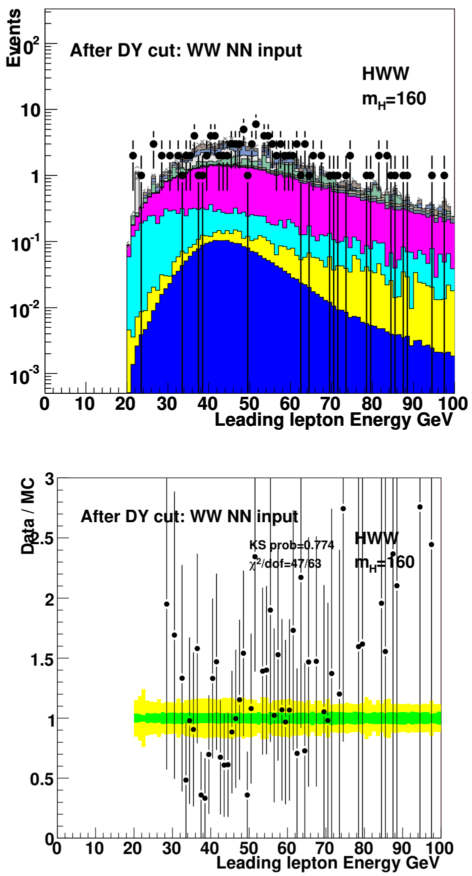




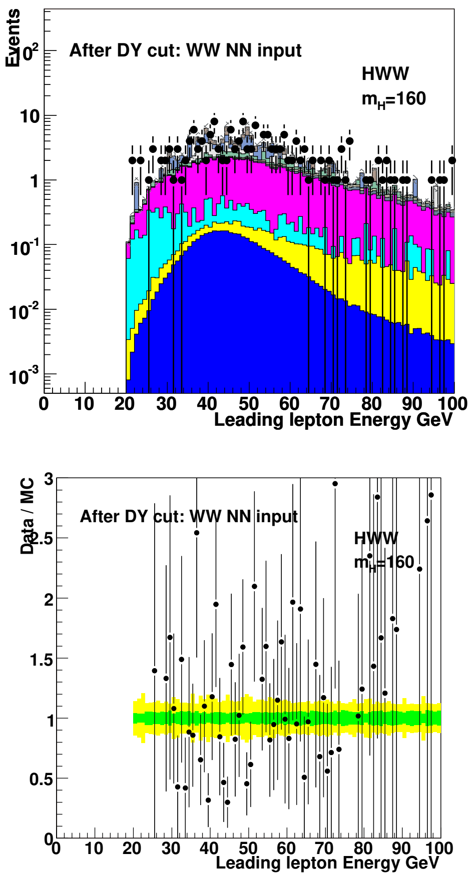
Five most separated plots after DY cut

M_H=160: first lepton Et

8700



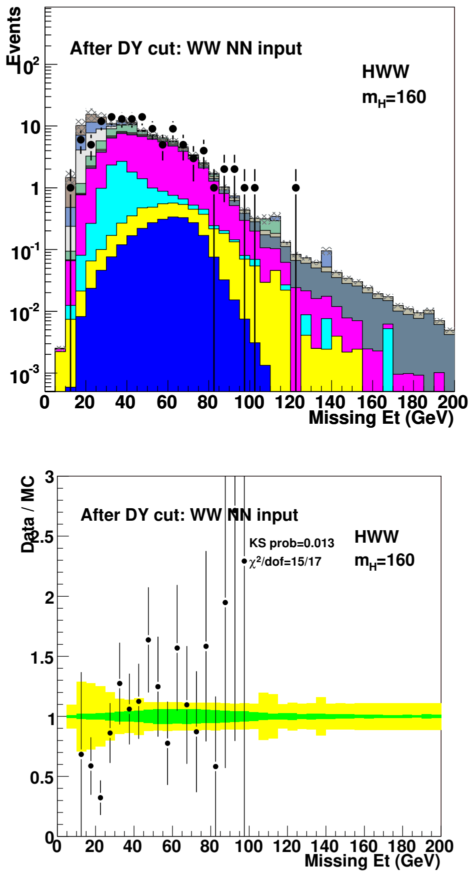
now



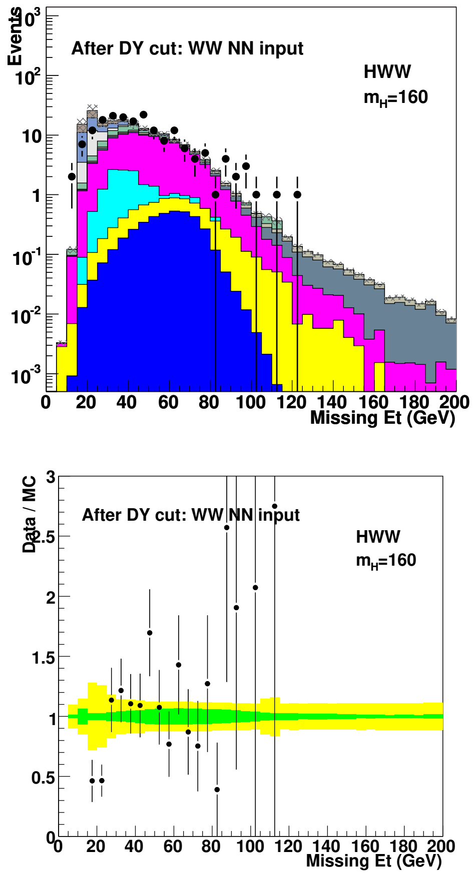
Five most separated plots after DY cut

M_H=160: Missing Et

8700



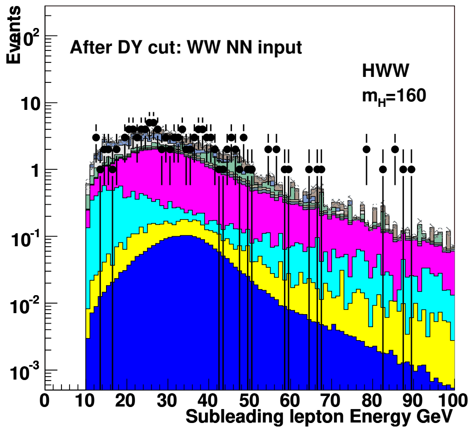
now

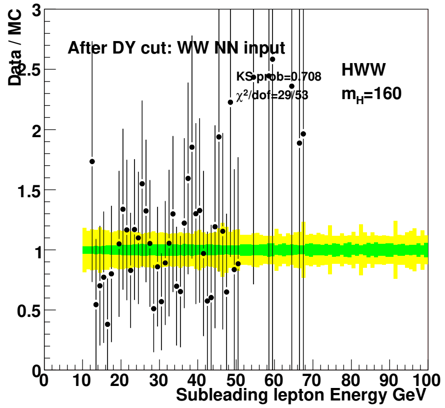


Five most separated plots after DY cut

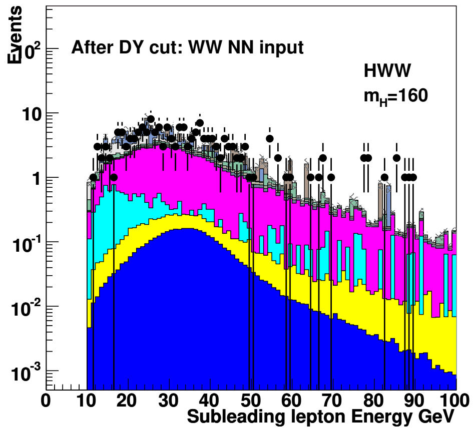
M_H=160: second lepton Et

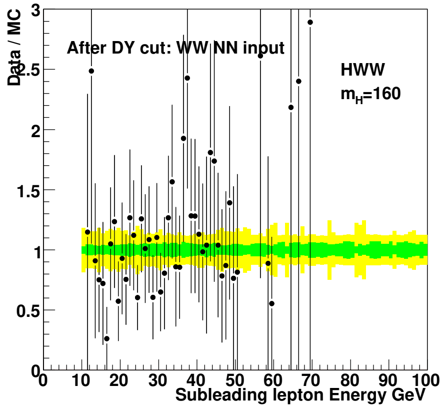
8700



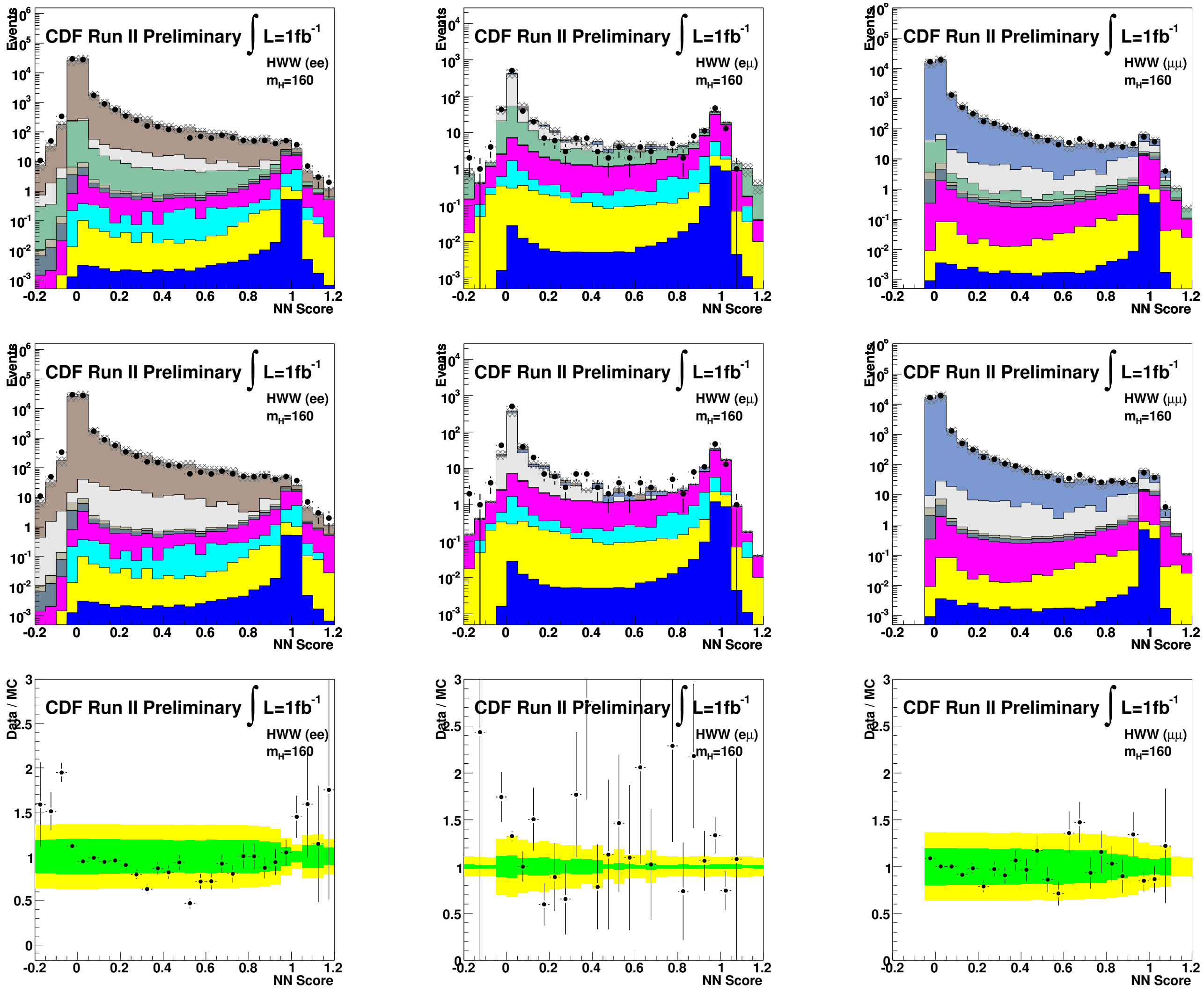


now

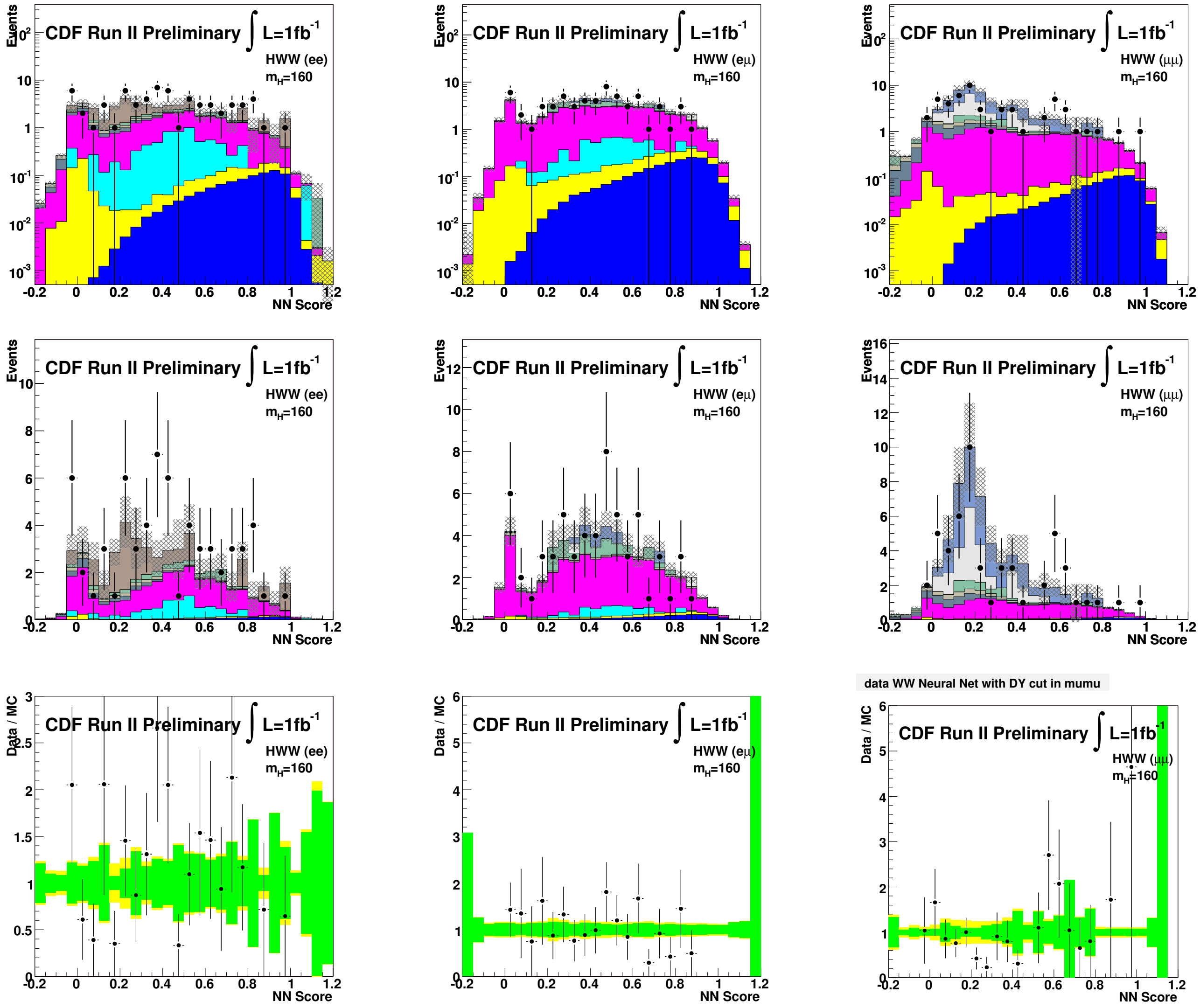




Drell Yan Neural Nets scores M_H=160



WW NN scores after DY cut M_H=160

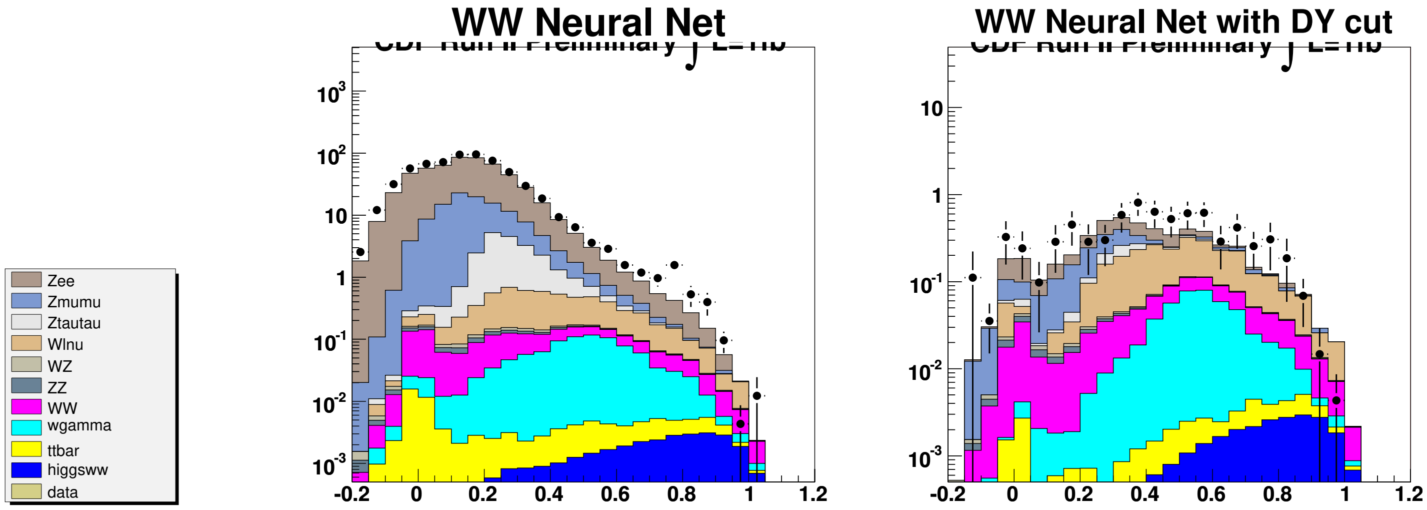


To Do

- investigate CMX cross-sections and correct if necessary
- include the gen5 and gen6 proportionally
- recheck systematics
- retrain Neural Nets if necessary
- recheck scale factors
- do limit calculation over all mass points

Back-up Slides

Fakes' Components Study



- Plots show **Fakes only** from data and MonteCarlo
- Before the DYNN cut, the fake sample is initially dominated by DY events, in which the fakable object is an actual lepton. These events are removed by the cut
- After the cut, Higgs-like fakes are W+Jets and provide our final estimate of possible Higgs fakes