WZ Trilepton Update in 5.3fb^{-1}

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Intro.

- Reminder [CDF8659]: Previous analysis used 1.1fb^{-1},
  - observed 16 events
  - expected 9.75 *WZ* events
  - expected 2.65 background events
  - measured $5.0^{+1.8}_{-1.6}\text{pb}^{-1}$

Selection

- The same *Diboson* framework of the $H \rightarrow WW$ group is used for this WZ measurement.
- Signal Region:
  - $\not{E}_T > 20.0\text{GeV}$
  - All Jet Bins
  - 3 Leptons
  - Z-boson selection: Of the three dilepton pairing, at least one has $m_{ll} \in [71.0, 111.0]\text{GeV}$, opposite electric charge, and same lepton flavor.
- Control Region:
  - $10.0 < \not{E}_T < 20.0\text{GeV}$
  - All Jet Bins
  - 3 Leptons
  - Same Z-Selection.

WZ Signal & Control Region Count

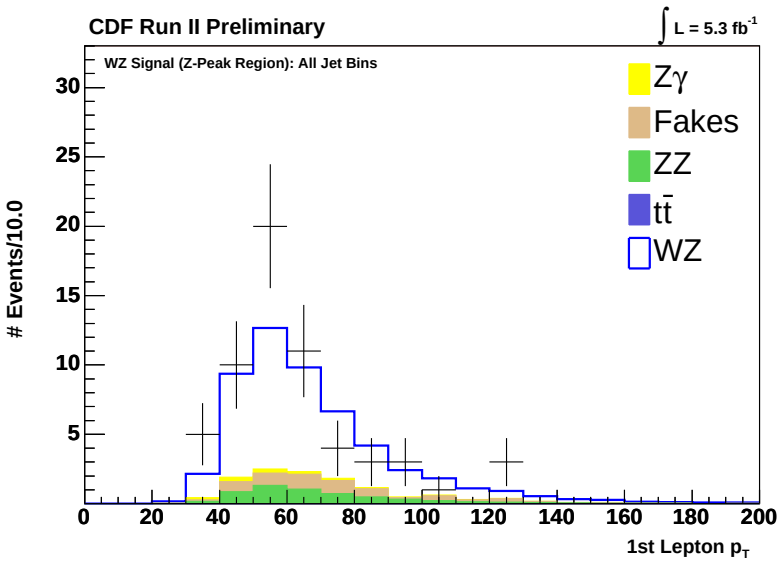
CDF Run II Public $\int \mathcal{L} = 5.3\ \mathrm{fb}^{-1}$

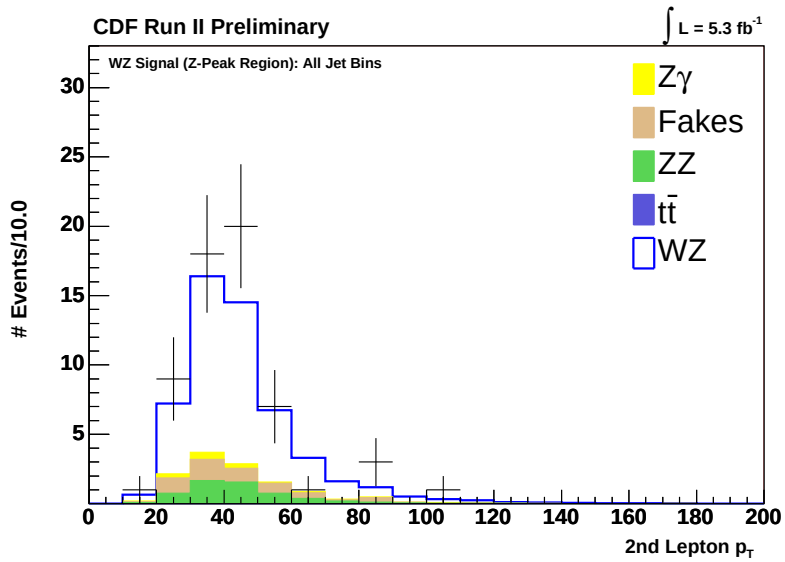
	WZ **Signal Region**			*WZ* **Control Region**		
ZZ	5.64	$\pm$	0.75_{syst}	3.27	$\pm$	0.43_{syst}
$Z\gamma$	1.55	$\pm$	0.36_{syst}	14.3	$\pm$	3.35_{syst}
Fakes (*WW*,*Z*+Jets)	5.34	$\pm$	1.18_{syst}	16.2	$\pm$	3.57_{syst}
$t\bar{t}$	0.06	$\pm$	0.019_{syst}	0.004	$\pm$	0.001_{syst}
Total Background	12.6	$\pm$	1.49_{syst}	33.8	$\pm$	5.00_{syst}
WZ	40.5	$\pm$	6.25_{syst}	4.57	$\pm$	0.71_{syst}
Data	60			41		

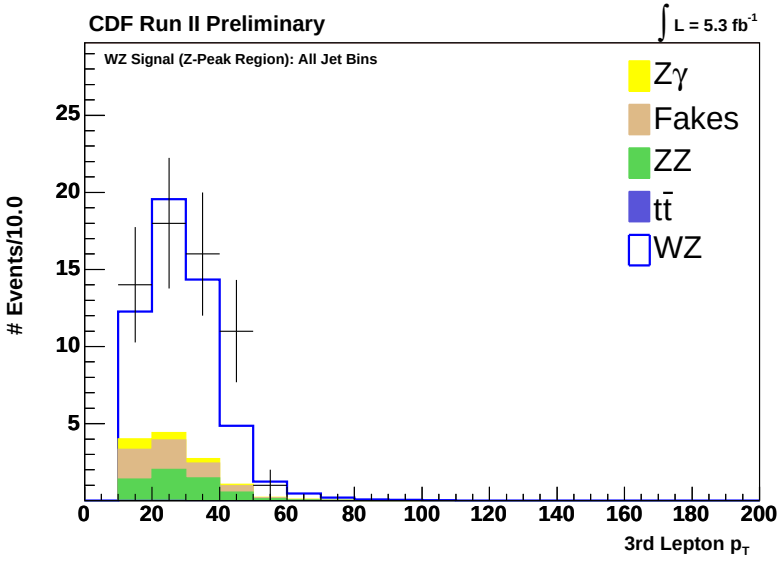
High Mass

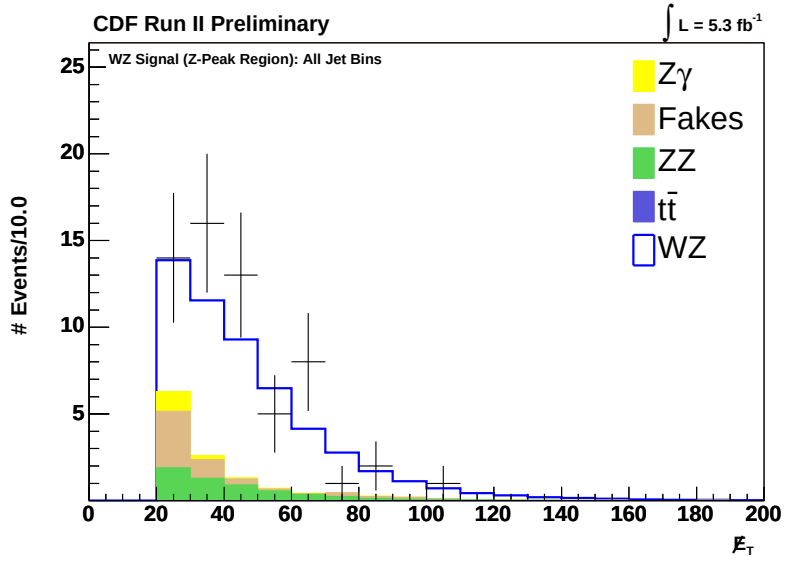
*Systematic errors subject to change

WZ Signal Region: Basic Values

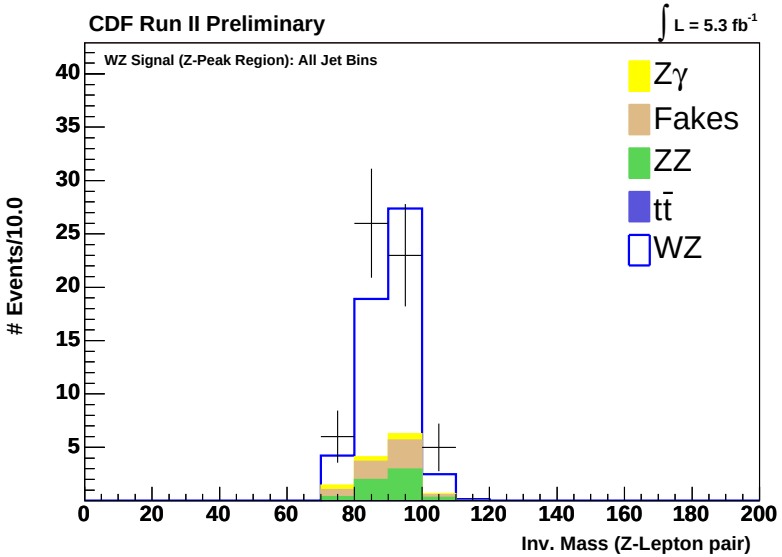


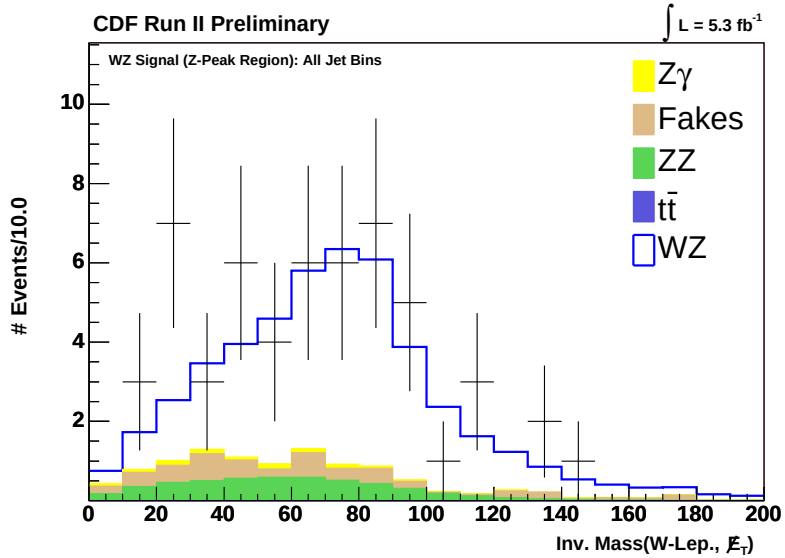


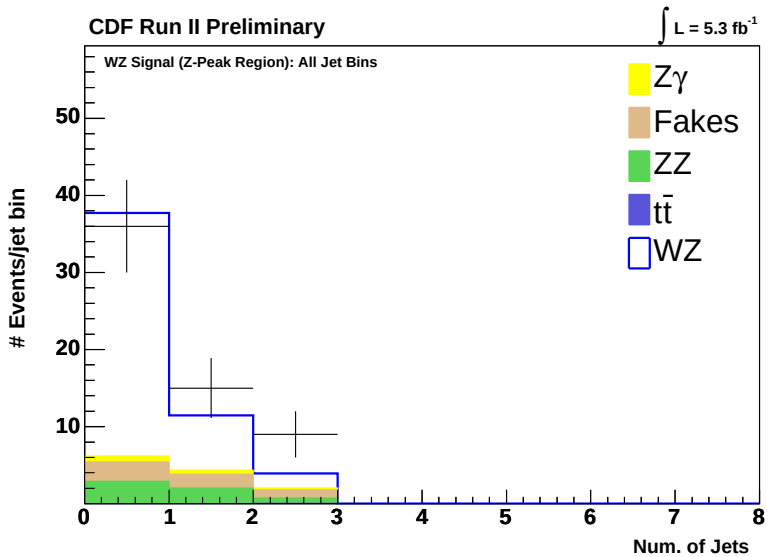


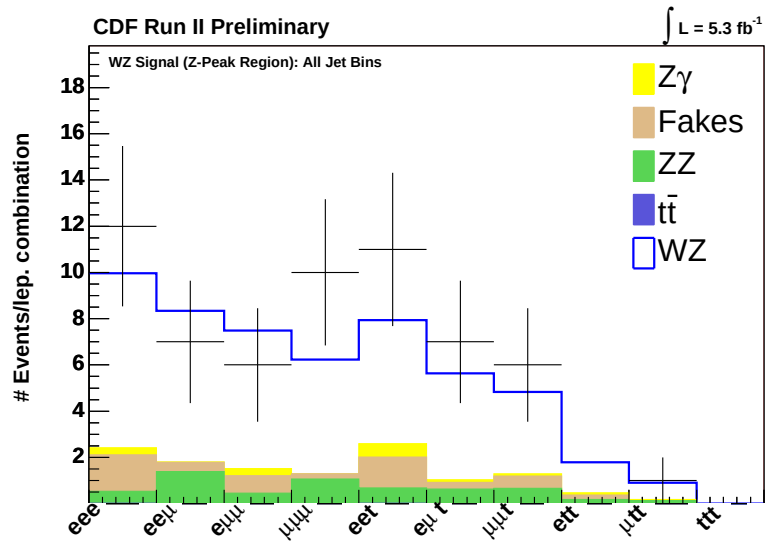


WZ Signal Region: More Values

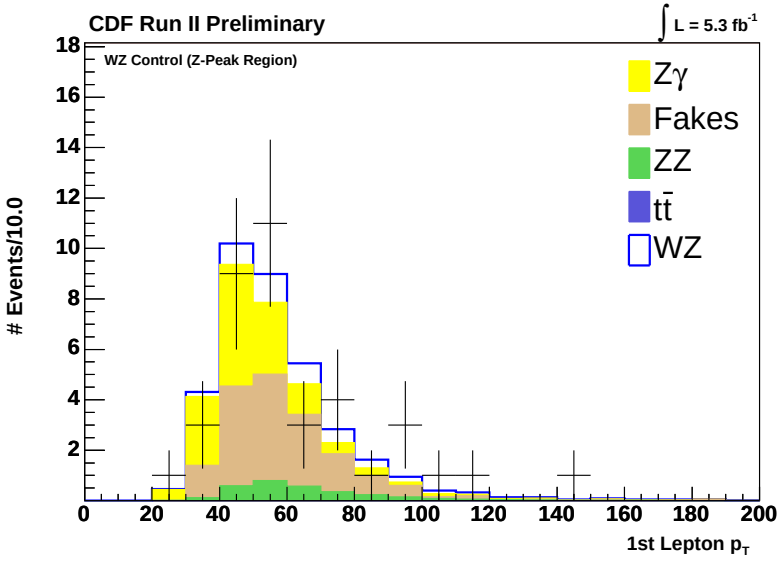


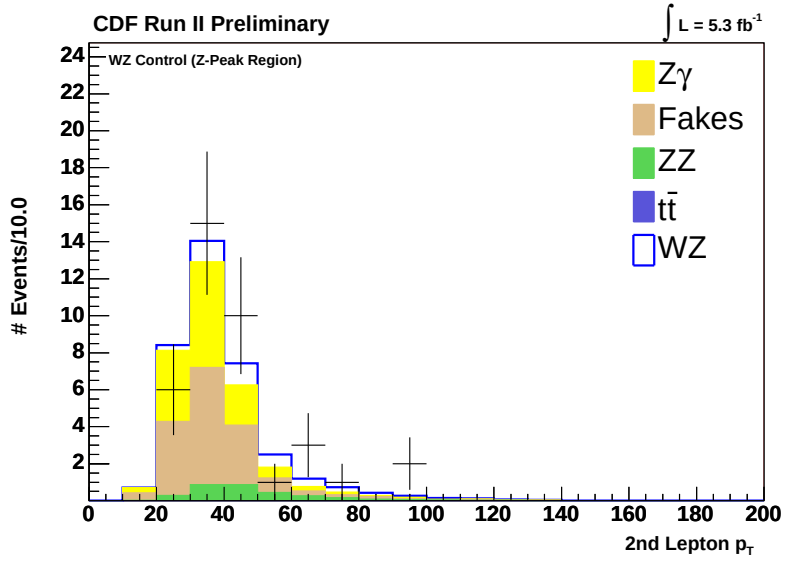


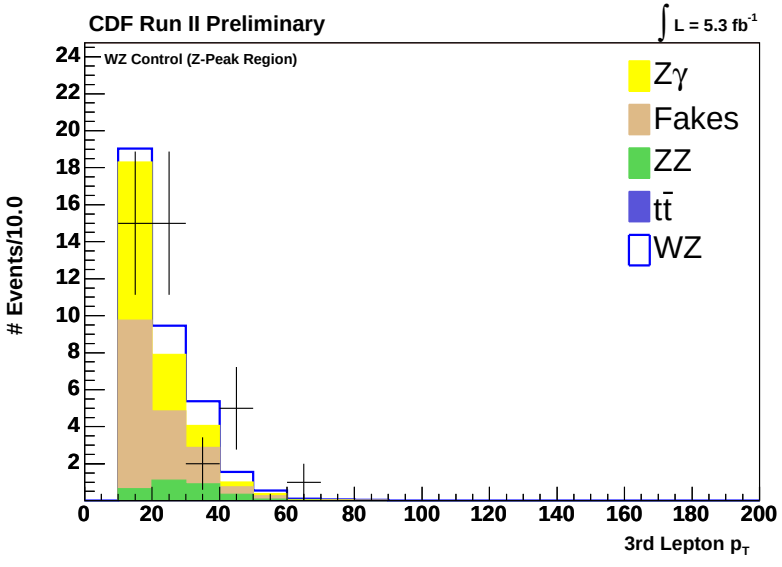


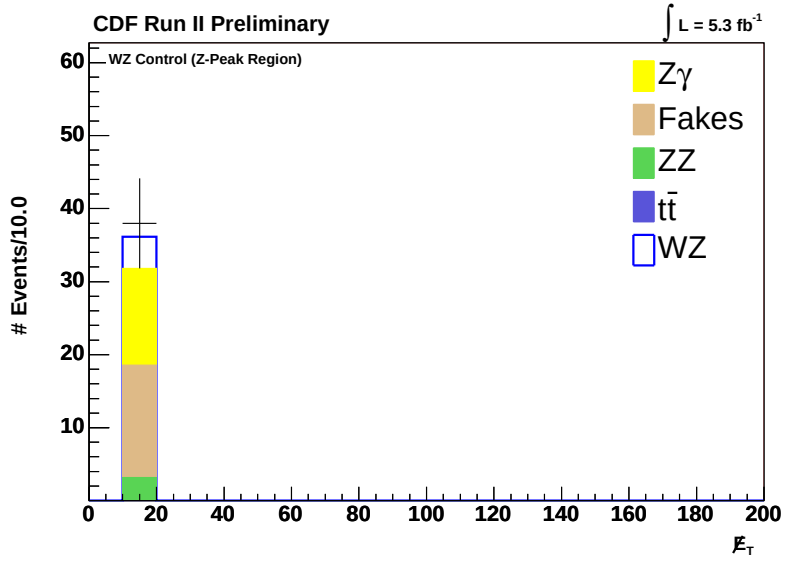


WZ Control Region ($10 < \not\!\!E_T < 20$): Basic Values

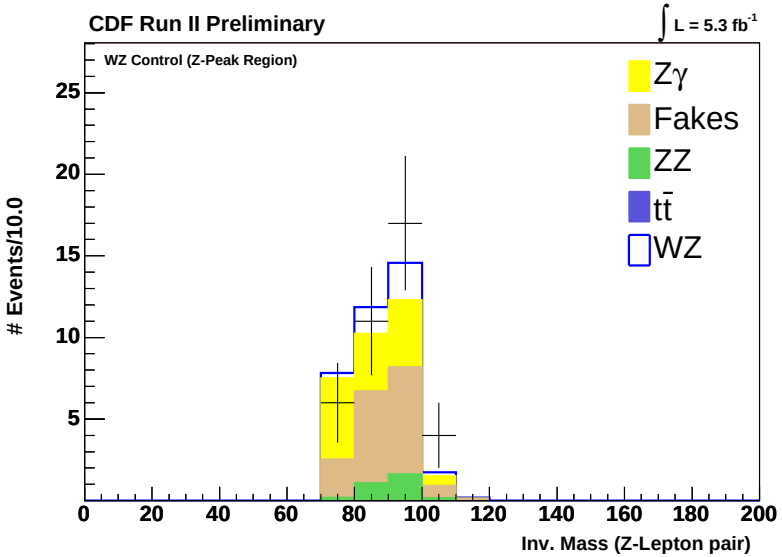


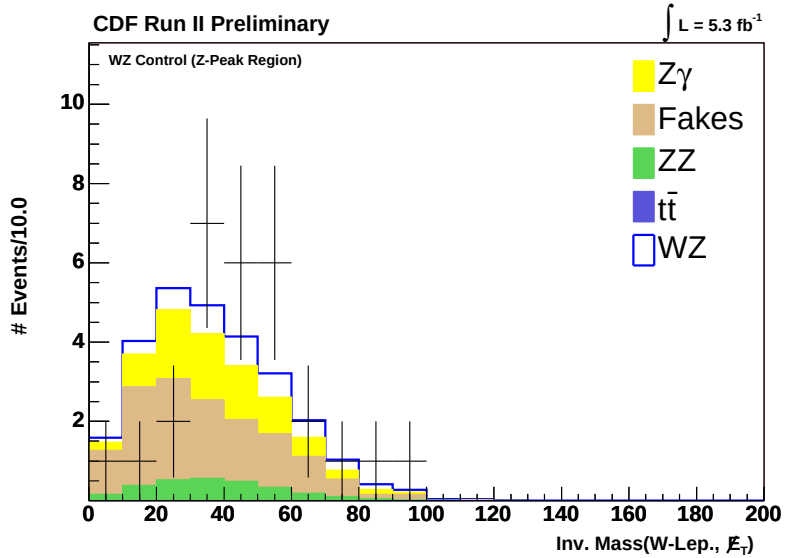


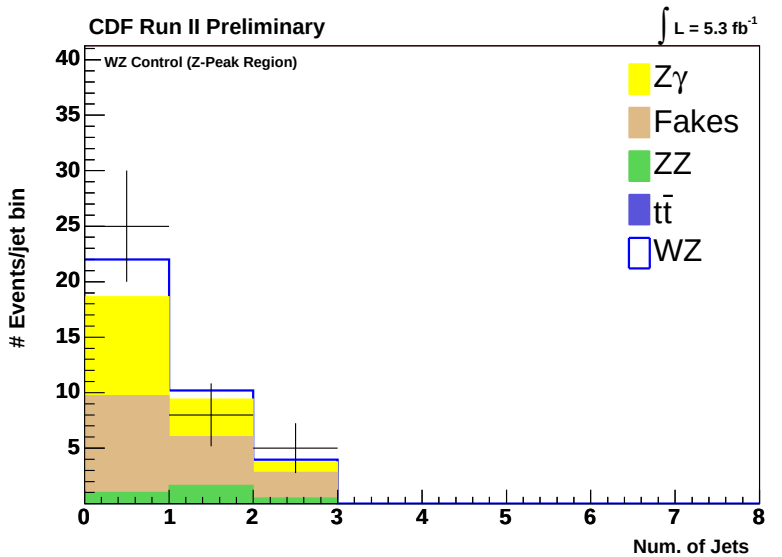


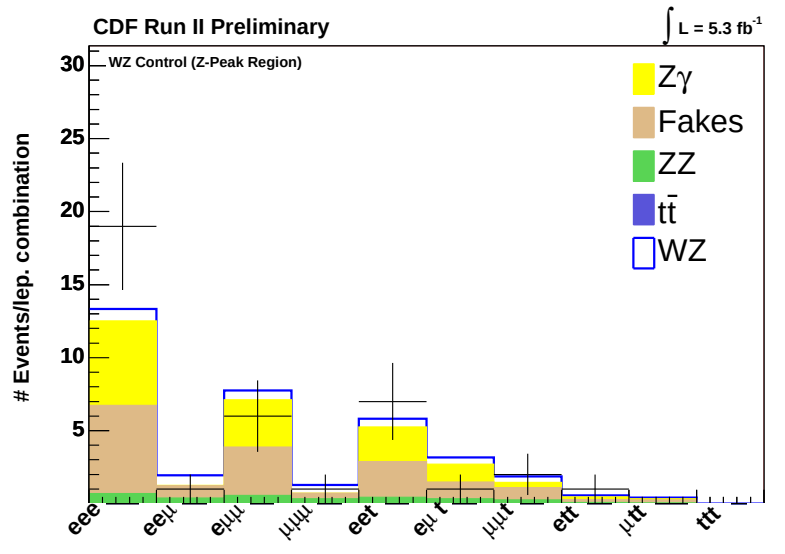


WZ Control Region ($10 < \not\!\!E_T < 20$): More Values

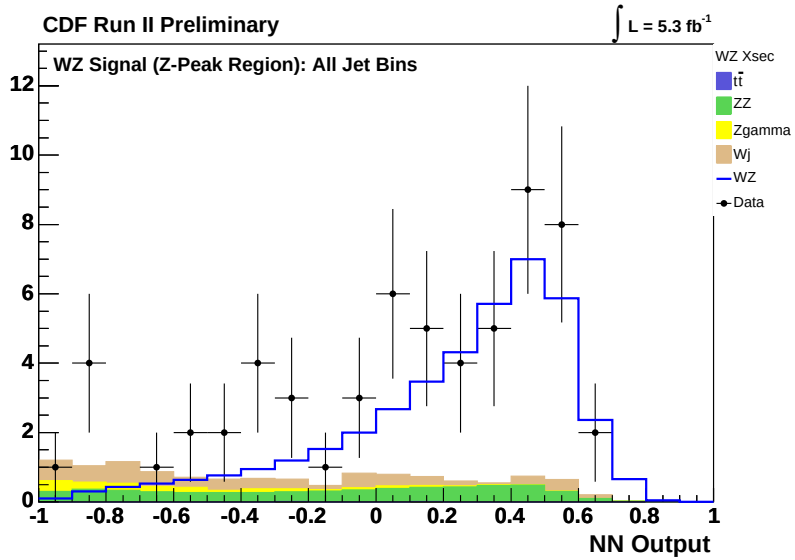


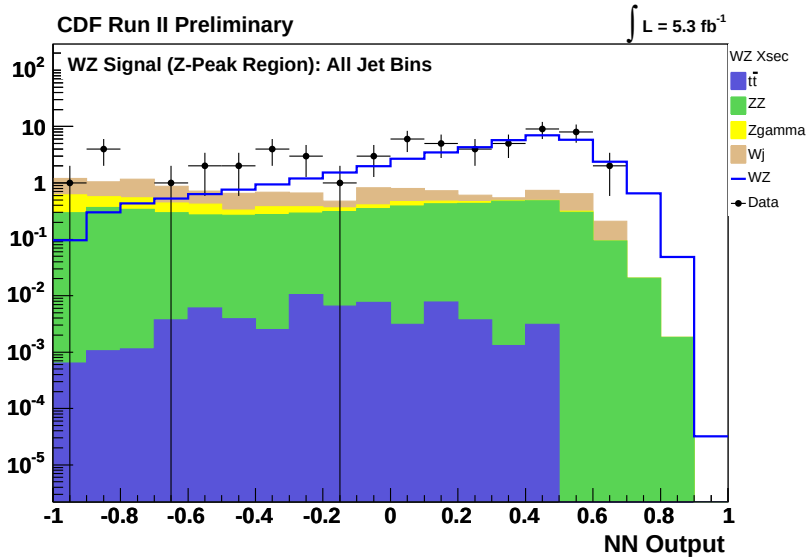




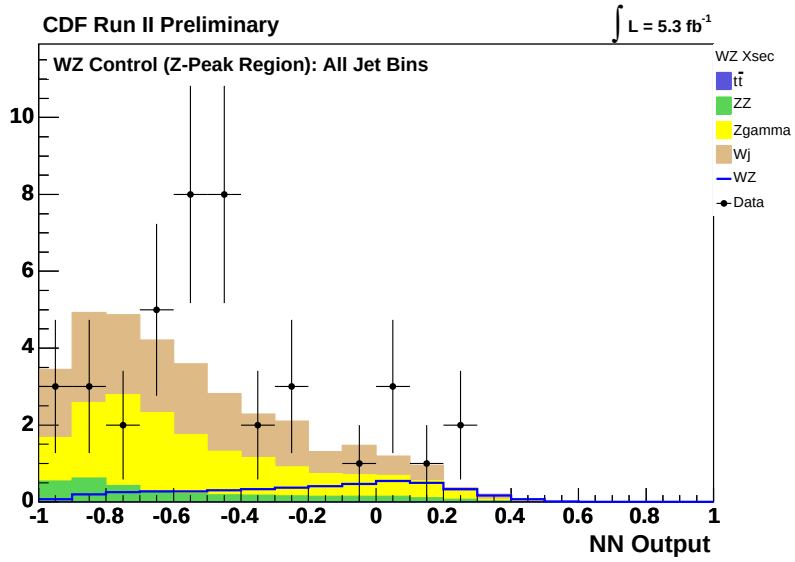


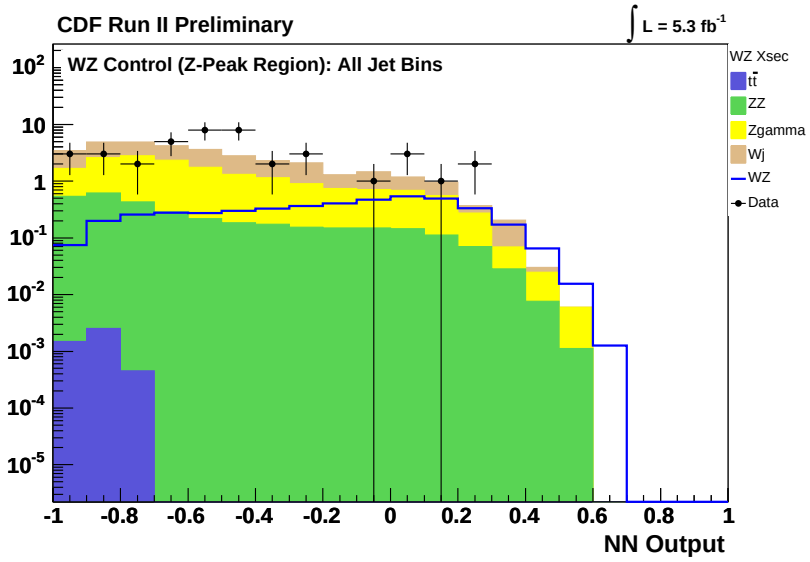
WZ: Signal Region Neural Net





WZ: Control Region Neural Net





NN Score > 0.0

CDF Run II Public $\int \mathcal{L} = 5.3\ \mathrm{fb}^{-1}$

	WZ **Full Signal Region**			*WZ* **NN Score** > 0.0 **Region**		
ZZ	5.64	$\pm$	0.75_{syst}	2.61	$\pm$	0.35_{syst}
$Z\gamma$	1.55	$\pm$	0.36_{syst}	0.18	$\pm$	0.04_{syst}
Fakes (*WW*,*Z*+Jets)	5.34	$\pm$	1.18_{syst}	1.49	$\pm$	0.33_{syst}
$t\bar{t}$	0.06	$\pm$	0.019_{syst}	0.02	$\pm$	0.006_{syst}
Total Background	12.6	$\pm$	1.49_{syst}	4.30	$\pm$	0.49_{syst}
WZ	40.5	$\pm$	6.25_{syst}	32.1	$\pm$	4.95_{syst}
Data	60			39		

High Mass

*Systematic errors subject to change

NN Score > 0.0

Effect of the NN score > 0.0 cut:

- ZZ: decrease 54%
- Zγ: decrease 88%
- Fakes: decrease 72%
- $t\bar{t}$: decrease 67%
- Total Background: decrease 66%
- WZ: decrease 21%
- Data: decrease 35%
- Signal/Background Ratio:
  - Before: 3.21
  - After (NN > 0.0): 7.47

NN Score $>$ 0.0

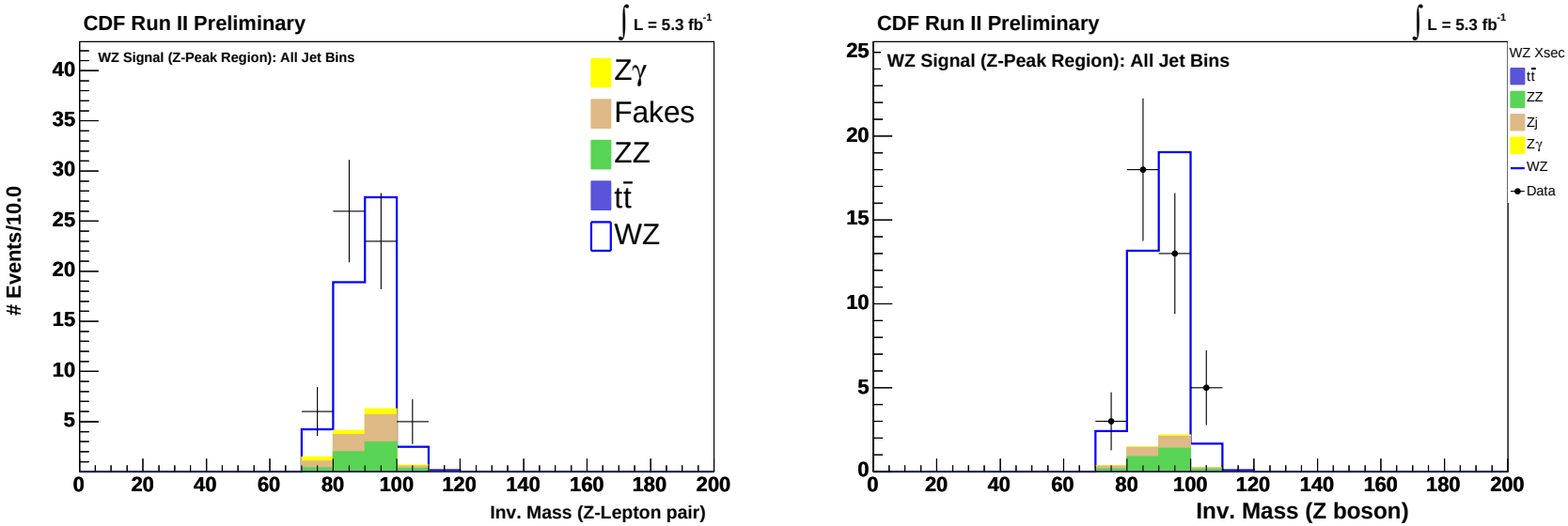


Figure: Left: full region (same as earlier). Right: NN score $>$ 0.0

Conclusions

Yet to do:

- Most of the systematic errors are recycled from the Higgs trilepton analysis, but a couple need to be recalculated.
- The *WWFit* module used to extract the *WW* cross section (CDF note 9723) is being refashioned into a *WZFit* module to calculate the observed *WZ* cross section.
- Improve discriminating variable list