SR, Nominal Systematic, Yield Table for Input Samples

SR, Non	ninal Systematic, Yield			
		2jets	2jets	2jets
Sample	Classification	modTopness≥ 6.4	modTopness≥ 6.4	modTopness≥ 6.4
		250 < MET < 350	350 < MET < 450	MET > 450
Data, single $e/\mu$ , MET	Inclusve	$107.00 \pm 10.34$	$17.00 \pm 4.12$	$8.00 \pm 2.83$
	Inclusve	88.56 ± 4.72	$13.64 \pm 1.81$	$4.35 \pm 0.96$
	1 lepton	20.44 ± 3.81	$4.53 \pm 1.46$	$2.41 \pm 0.79$
	1 lepton, from W	19.85 ± 3.80	4.53 ± 1.46	$2.41 \pm 0.79$
All Background	1 lepton, from t	0.59 ± 0.30	1.00 ± 1.10	
	> 2 leptons	62.89 ± 2.68	$7.23 \pm 0.95$	$0.72 \pm 0.20$
	$Z \rightarrow \nu \nu$	$5.23 \pm 0.75$	1.88 ± 0.50	1.23 ± 0.51
	Inclusve	57.79 ± 2.05	$6.23 \pm 0.62$	$0.49 \pm 0.16$
	1 lepton	$0.59 \pm 0.30$		
, <del>,</del>	1 lepton, from W	_	_	_
$tar{t}$	1 lepton, from t	$0.59 \pm 0.30$	_	_
	≥ 2 leptons	$57.20 \pm 2.03$	$6.23 \pm 0.62$	$0.49 \pm 0.16$
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$0.27 \pm 0.27$	_	_
	1 lepton	$0.27 \pm 0.27$	_	<u> </u>
$t\bar{t}$ , single lepFromT, madgraph pythia8	1 lepton, from W	_	_	<u> </u>
tt, single teprionii, maugiaphi pytmas	1 lepton, from $t$	$0.27 \pm 0.27$	_	_
	$\geq 2$ leptons	_	-	_
	$Z \rightarrow \nu \nu$	_	<u> </u>	<u> </u>
	Inclusve	$0.32 \pm 0.14$		_
	1 lepton	$0.32 \pm 0.14$	_	_
$t\bar{t}$ , single lepFromTbar, madgraph pythia8, ext1	1 lepton, from W	l	_	_
,	1 lepton, from t	$0.32 \pm 0.14$	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$		_	_
	Inclusve	$57.20 \pm 2.03$	$6.23 \pm 0.62$	$0.49 \pm 0.16$
	1 lepton	_	_	_
$t\bar{t}$ , diLepton, madgraph pythia8, ext1	1 lepton, from W 1 lepton, from t	_	_	_
	> 2 leptons	57.20 ± 2.03	6.23 ± 0.62	0.49 ± 0.16
	$Z \rightarrow \nu \nu$	07.20 ± 2.00	0.25 ± 0.02	0.43 ± 0.10
	Inclusve	3.65 ± 1.66	0.70 ± 0.70	
	1 lepton	0.00 ± 1.00	0.10 ± 0.10	_
	1 lepton, from W	_	_	_
single t	1 lepton, from t	_	_	<u> </u>
	> 2 leptons	$3.65 \pm 1.66$	$0.70 \pm 0.70$	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$3.65 \pm 1.66$	$0.70 \pm 0.70$	_
	1 lepton	_	_	<u> </u>
single $t \ t - W$ -channel	1 lepton, from W	_	_	_
single v v = channel	1 lepton, from $t$	_	_	_
	$\geq 2$ leptons	$3.65 \pm 1.66$	$0.70 \pm 0.70$	_
	$Z \rightarrow \nu \nu$	_	_	
	Inclusve	_	_	_
	1 lepton	_	_	_
single $t$ , $t - W$ -channel, powheg pythia8	1 lepton, from W	_	_	_
	1 lepton, from t	_	_	_
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$			
	$Z \rightarrow \nu \nu$ Inclusve	3.65 ± 1.66	0.70 ± 0.70	
	1 lepton	3.03 ± 1.00	0.70 ± 0.70	
	1 lepton, from W	_	_	_
single $\bar{t}$ , $t-W$ -channel, powheg pythia8	1 lepton, from t	_	_	_
	> 2 leptons	$3.65 \pm 1.66$	$0.70 \pm 0.70$	_
	$Z \rightarrow \nu \nu$			_
	Inclusve	_	_	
	1 lepton	_	_	_
-i1- 4 4 W -b1	1 lepton, from W	_	_	_
single $t$ non $t-W$ -channel	1 lepton, from t	_	_	_
	≥ 2 leptons	-	_	_
	$Z \rightarrow \nu \nu$	-	_	_
			Cor	ntinued on next page
				1 .0.

Sample Classification $\frac{2 \text{ jets}}{250 \text{ km}^{2} \text{ Continue}} \ge 0.4 \\ -250 \text{ km}^{2} \text{ Continue} \ge 0.4 \\ -250  k$	Tab	le 1 – continued fro			
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			2jets	2jets	2jets
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Sample	Classification			
single $t$ , s-channel, amenlo pythia8   1 lepton, from $t$   2 perton from $t$   1 lepton, from $t$   2 leptons   2 pertons   2 p			250 < MET < 350	350 < MET < 450	MET > 450
single $t$ , s-channel, amenlo pythia8   1 lepton, from $t$   2 perton from $t$   1 lepton, from $t$   2 leptons   2 pertons   2 p		Inclusve	_	_	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_
$ \begin{array}{c} 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z = \nu \nu \\ \\ V + \text{Jets} \\ \\ $			_	_	_
$V+ \text{Jets} \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$	single t, s-channel, amcnlo pythia8		_	_	<u> </u>
$V+ \text{Jets} \qquad \begin{array}{ c c c c c } \hline & Incluse & 17.02 \pm 3.65 & 4.36 \pm 1.45 & 2.41 \pm 0.79 \\ \hline & 1 \log ton & W & 17.02 \pm 3.65 & 4.36 \pm 1.45 & 2.41 \pm 0.79 \\ \hline & 1 \log ton & W & 17.02 \pm 3.65 & 4.36 \pm 1.45 & 2.41 \pm 0.79 \\ \hline & 1 \log ton & W & 17.02 \pm 3.65 & 4.36 \pm 1.45 & 2.41 \pm 0.79 \\ \hline & 2 \log ton & - & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & - & - & - & - & - \\ \hline & 2 \log ton & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - \\ \hline & 2 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 1 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - & - & - \\ \hline & 2 \log ton & W & - & - $			_	_	_
$V+ \text{Jets} \qquad \begin{array}{c} \text{Incluse} \\ 1 \text{ lepton} \\ 1 \text$			_	_	_
$V+ \text{Jets} \qquad \begin{cases} & 1 \text{ lepton, from } W \\ & 1 \text{ lepton, from } W \\ & 2 \text{ Jeptons} \\ & Z - \nu \nu \\ \\ & DY+ \text{Jets} \rightarrow \ell \ell \end{cases} \qquad \begin{cases} & 1 \text{ lepton, from } W \\ & 1 \text{ lepton, from } W \\ & 2 \text{ Jeptons} \\ & Z - \nu \nu \\ \\ & DY+ \text{Jets} \rightarrow \ell \ell \end{cases} \qquad \begin{cases} & 1 \text{ lepton, from } W \\ & 1 \text{ lepton, from } W \\ & 2 \text{ Jeptons} \\ & Z - \nu \nu \\ \\ & DY+ \text{Jets} \rightarrow \ell \ell \end{cases} \qquad \begin{cases} & 1 \text{ lepton, from } W \\ & 2 \text{ leptons} \\ & 2 - \nu \nu \\ & 1 \text{ lepton, from } W \\ & 2 \text{ leptons} \\ & 2 - \nu \nu \\ & 1 \text{ lepton, from } W \\ & 2 \text{ leptons} \\ & 2 \text{ lepton} \\ & 1 \text{ lepton, from } W \\ & 1 \text{ lepton, from } W \\ & 2 \text{ leptons} \\ & 2 - \nu \nu \\ & 1 \text{ lepton, from } W \\ & 2 \text{ leptons} \\ & 2 \text{ lepton, from } W \\ & 2 \text{ leptons} \\ & 2  lep$			$17.02 \pm 3.65$	$4.36 \pm 1.45$	$2.41 \pm 0.79$
$V + \text{Jets} \qquad \begin{cases} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z = \nu\nu \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ Z = \nu\nu \\ 1 \text{ lepton} \end{cases}$ $DY + \text{Jets} \rightarrow \ell\ell \qquad \begin{cases} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 3 \text{ lepton, from } W \\ 4  lepton, from$					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	V+Jets				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	<u> </u>
			_	_	<u>—</u>
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	<u> </u>	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$DY + Jets \rightarrow \ell\ell$		_	_	_
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			_	_	_
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$DY+Jets \rightarrow \ell\ell$ , M10to50, amcnlo pythia8		_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_
			_	_	_
			_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$DY+Jets \rightarrow \ell\ell$ , M50, amenlo pythia8		_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	<u> </u>	_
$ \text{W+Jets} \rightarrow \ell \nu \\ \text{W+Jets}$			_	<u> </u>	_
			$17.02 \pm 3.65$	$4.36 \pm 1.45$	$2.41 \pm 0.79$
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
	$W+Jets \rightarrow \ell \nu$				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	<u> </u>	_
$ \text{W+Jets} \rightarrow \ell \nu, \ 100 < HT < 200, \ \text{madgraph pythia8} \\ \text{W+Jets} \rightarrow \ell \nu, \ 100 < HT < 200, \ \text{madgraph pythia8} \\ \text{W+Jets} \rightarrow \ell \nu, \ 100 < HT < 200, \ \text{madgraph pythia8} \\ \text{Inclusve} \\ \text{Ilepton, from } t \\ \geq 2 \ \text{leptons} \\ Z \rightarrow \nu \nu \\ \text{Ilepton} \\ \text{Inclusve} \\ \text{Ilepton} \\ Ilep$			_	_	_
			2.12 + 1.50	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				_	<u> </u>
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	W. I. A. 100 & H.W. 1000			_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	W+Jets $\rightarrow \ell \nu$ , 100 < HT < 200, madgraph pythia8			_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_
$ \text{W+Jets} \rightarrow \ell \nu, \ 200 < HT < 400, \ \text{madgraph pythia8} \\ \text{W+Jets} \rightarrow \ell \nu, \ 200 < HT < 400, \ \text{madgraph pythia8} \\ \text{W+Jets} \rightarrow \ell \nu, \ 200 < HT < 400, \ \text{madgraph pythia8} \\ \text{W+Jets} \rightarrow \ell \nu, \ 400 < HT < 600, \ \text{madgraph pythia8} \\ \text{W+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8} \\ \text{W+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8} \\ \text{W+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8} \\ \text{W+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8} \\ \text{W+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8} \\ \text{W+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8} \\ \text{W+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8}} \\ \text{M+Jets} \rightarrow \ell \nu, \ 400 < HT < 400, \ 400, \ 400, \ 400, \ 400, \ 400, \ 400, \ 400, \ 400, \ 400, \ 400, \ 400, \ 400, \ 400, \ 400, $			_	_	_
			$12.62 \pm 3.16$	$2.80 \pm 1.27$	$0.76 \pm 0.54$
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	W. I				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$W + Jets \rightarrow \ell \nu$ , 200 $\langle HT \rangle \langle 400$ , madgraph pythia8			_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_
$ \text{W+Jets} \rightarrow \ell \nu, \ 400 < HT < 600, \ \text{madgraph pythia8} \\ \text{W+Jets} \rightarrow \ell \nu, \ 400 < HT < 800, \ \text{madgraph pythia8} \\ \text{W+Jets} \rightarrow \ell \nu, \ 600 < HT < 800, \ \text{madgraph pythia8} \\ \text{Inclusve} \\ 1 \ \text{lepton, } $			_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			$0.89 \pm 0.89$	$0.40 \pm 0.40$	$0.42 \pm 0.42$
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	W. I. A. 400 & H.W. 1000				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	W+Jets $\rightarrow \ell \nu$ , 400 < HT < 600, madgraph pythia8		_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_
			_	_	_
			$0.52 \pm 0.26$	$0.22 \pm 0.13$	$0.34 \pm 0.16$
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
w+Jets $\rightarrow \ell \nu$ , 000 $<$ H1 $<$ 800, magraph pythias 1 lepton, from t $         -$	W. I. A. COO & H.W. & COO . 1				
$\geq 2 \  ext{leptons} \qquad \qquad - \qquad \qquad - \qquad \qquad - \qquad \qquad Z  o  u  orange 2 \rightarrow \nu \nu \rightarrow  \q$	$w + \text{Jets} \rightarrow \ell \nu$ , 600 < $HT$ < 800, madgraph pythia8		_	_	_
Z  ightarrow  u  u  u  u  u  u  u  u  u  u  u  u  u			_	_	_
			_	_	_
		*		Cor	ntinued on next page

Tab	le 1 - continued fro			
		2jets	2jets	2jets
Sample	Classification	modTopness≥ 6.4	modTopness≥ 6.4	modTopness≥ 6.4
		250 < MET < 350	350 < MET < 450	MET > 450
	Inclusve	$0.16 \pm 0.08$	$0.16 \pm 0.08$	$0.56 \pm 0.15$
	1 lepton	$0.16 \pm 0.08$	$0.16 \pm 0.08$	$0.56 \pm 0.15$
W+Jets $\rightarrow \ell \nu$ , 800 < HT < 1200, madgraph pythia8	1 lepton, from W	$0.16 \pm 0.08$	$0.16 \pm 0.08$	$0.56 \pm 0.15$
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$			
	Inclusve	$0.66 \pm 0.47$	$0.79 \pm 0.56$	0.33 ± 0.33
	1 lepton 1 lepton, from W	$0.66 \pm 0.47$ $0.66 \pm 0.47$	$\begin{array}{c} 0.79 \pm 0.56 \\ 0.79 \pm 0.56 \end{array}$	$0.33 \pm 0.33$ $0.33 \pm 0.33$
W+Jets $\rightarrow \ell \nu$ , 1200 < HT < 2500, madgraph pythia8	1 lepton, from t	0.66 ± 0.47	0.79 ± 0.56	0.33 ± 0.33
	> 2 leptons			_
	$Z \rightarrow \nu \nu$			
	Inclusve	$0.05 \pm 0.04$	_	$0.00 \pm 0.00$
	1 lepton	$0.05 \pm 0.04$ $0.05 \pm 0.04$		0.00 ± 0.00
	1 lepton, from W	$0.05 \pm 0.04$	_	0.00 ± 0.00
W+Jets $\rightarrow \ell \nu$ , 2500 $< HT < Inf$ , madgraph pythia8	1 lepton, from t	0.00 ± 0.04	_	0.00 ± 0.00
	> 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$10.11 \pm 1.42$	$2.35 \pm 0.53$	$1.45 \pm 0.53$
	1 lepton	2.83 ± 1.07	$0.17 \pm 0.07$	
B	1 lepton, from W	$2.83 \pm 1.07$	$0.17 \pm 0.07$	_
Rare	1 lepton, from t	$0.00 \pm 0.00$	_	_
	≥ 2 leptons	$2.05 \pm 0.55$	$0.30 \pm 0.17$	$0.22 \pm 0.13$
	$Z \rightarrow \nu \nu$	$5.23 \pm 0.75$	$1.88 \pm 0.50$	$1.23 \pm 0.51$
	Inclusve	$7.83 \pm 1.41$	$1.89 \pm 0.53$	$1.20 \pm 0.53$
	1 lepton	$2.83 \pm 1.07$	$0.17 \pm 0.07$	_
diBoson	1 lepton, from W	$2.83 \pm 1.07$	$0.17 \pm 0.07$	_
	1 lepton, from t	<del></del>		l <del></del>
	≥ 2 leptons	$1.63 \pm 0.54$	$0.29 \pm 0.17$	$0.20 \pm 0.12$
	$Z \rightarrow \nu \nu$	3.36 ± 0.75	$1.43 \pm 0.50$	$1.00 \pm 0.51$
	Inclusve	3.93 ± 1.19	$0.20 \pm 0.14$	$0.08 \pm 0.08$
	1 lepton 1 lepton, from W	$2.38 \pm 1.07$ $2.38 \pm 1.07$	_	_
WW	1 lepton, from t	2.38 ± 1.07	<del>-</del>	_
	> 2 leptons	$1.55 \pm 0.54$	$0.20 \pm 0.14$	0.08 ± 0.08
	$Z \rightarrow \nu \nu$	1.00 ± 0.04	0.20 ± 0.14	0.00 ± 0.00
	Inclusve	$1.55 \pm 0.54$	$0.20 \pm 0.14$	$0.08 \pm 0.08$
	1 lepton		<u> </u>	
11/11/ 0/0	1 lepton, from W	_	_	_
$WW \rightarrow 2\ell 2\nu$ , powheg	1 lepton, from t	_	_	_
	≥ 2 leptons	$1.55 \pm 0.54$	$0.20 \pm 0.14$	$0.08 \pm 0.08$
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$2.38 \pm 1.07$	_	_
	1 lepton	$2.38 \pm 1.07$	<u> </u>	_
$WW \rightarrow \ell \nu qq$ , powheg	1 lepton, from W	$2.38 \pm 1.07$	<del>-</del>	_
11, Powmog	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$			
	Inclusve	3.73 ± 0.76	$1.65 \pm 0.51$	$1.08 \pm 0.52$
	1 lepton	$0.45 \pm 0.13$	$0.17 \pm 0.07$	_
WZ	1 lepton, from W 1 lepton, from t	$0.45 \pm 0.13$	$0.17 \pm 0.07$	_
	> 2 leptons	0.08 ± 0.04	$0.09 \pm 0.09$	0.12 ± 0.09
	$Z \rightarrow \nu \nu$	$3.20 \pm 0.75$	$1.39 \pm 0.50$	$0.12 \pm 0.09$ $0.96 \pm 0.51$
	Inclusve	$0.04 \pm 0.04$	0.09 ± 0.09	0.90 ± 0.91 0.11 ± 0.09
	1 lepton	0.04 ± 0.04	- 0.00	0.11 ± 0.03
	1 lepton, from W	_	_	_
$WZ \rightarrow 3\ell\nu$ , powheg pythia8	1 lepton, from t	_	_	_
	≥ 2 leptons	$0.04 \pm 0.04$	$0.09 \pm 0.09$	$0.11 \pm 0.09$
	$Z \rightarrow \nu \nu$	_	_	_
	•		Cor	ntinued on next page

Tab	le 1 - continued fro			
		2jets	2jets	2jets
Sample	Classification	modTopness≥ 6.4	modTopness≥ 6.4	modTopness≥ 6.4
		250 < MET < 350	350 < MET < 450	MET > 450
	Inclusve	$0.04 \pm 0.02$	_	$0.01 \pm 0.01$
	1 lepton	_	_	_
$WZ\rightarrow 2\ell 2Q$ , amenlo pythia8	1 lepton, from W	_	_	_
• **	1 lepton, from t		<del>-</del>	
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	$0.04 \pm 0.02$	<del>-</del>	$0.01 \pm 0.01$
	Inclusve	$0.45 \pm 0.13$	0.17 ± 0.07	
	1 lepton	$0.45 \pm 0.13$	$0.17 \pm 0.07$ $0.17 \pm 0.07$	_
	1 lepton, from W	$0.45 \pm 0.13$	$0.17 \pm 0.07$	_
$WZ \rightarrow \ell \nu 2Q$ , amenlo pythia8	1 lepton, from t			_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$3.20 \pm 0.75$	$1.39 \pm 0.50$	$0.96 \pm 0.51$
	1 lepton	_	_	_
$WZ \rightarrow 1\ell 3\nu$ , amenlo pythia8	1 lepton, from W	_	_	_
I I I I I I I I I I I I I I I I I I I	1 lepton, from t	_	<del>-</del>	_
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	3.20 ± 0.75	$-$ 1.39 $\pm$ 0.50	0.96 ± 0.51
	Inclusve	0.16 ± 0.02	$0.04 \pm 0.01$	0.96 ± 0.51 0.04 ± 0.01
	1 lepton	0.10 ± 0.02	U.U4 1 U.U1	0.04 ± 0.01
	1 lepton, from W	_	_	_
ZZ	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	$0.16 \pm 0.02$	$0.04 \pm 0.01$	$0.04 \pm 0.01$
	Inclusve	_	_	_
	1 lepton	_	_	_
$ZZ\rightarrow 2\ell 2Q$ , amcnlo pythia8	1 lepton, from W	_	<del>-</del>	_
• • • • • • • • • • • • • • • • • • • •	1 lepton, from t > 2 leptons	_	<del>-</del>	_
	$Z \rightarrow \nu \nu$			
	Inclusve	$0.13 \pm 0.02$	$0.04 \pm 0.01$	$0.03 \pm 0.01$
	1 lepton			
$ZZ\rightarrow 2\ell 2\nu$ , powheg pythia8	1 lepton, from W	_	_	_
ZZ→2εzν, powneg pythias	1 lepton, from $t$	_	_	_
	≥ 2 leptons	<del>-</del>	<del>-</del>	<u> </u>
	$Z \rightarrow \nu \nu$	$0.13 \pm 0.02$	$0.04 \pm 0.01$	$0.03 \pm 0.01$
	Inclusve	$0.03 \pm 0.01$	<del>-</del>	$0.01 \pm 0.01$
	1 lepton 1 lepton, from W	_	<del>-</del>	_
$ZZ\rightarrow 2Q2\nu$ , amenlo pythia8	1 lepton, from t			
	> 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	$0.03 \pm 0.01$	_	$0.01 \pm 0.01$
	Inclusve	$2.28 \pm 0.12$	$0.46 \pm 0.02$	$0.25 \pm 0.04$
	1 lepton	$0.00 \pm 0.00$	_	_
$t\bar{t} + V$	1 lepton, from W	_	_	_
00 T   1	1 lepton, from $t$	$0.00 \pm 0.00$	<del>-</del>	_
	≥ 2 leptons	$0.41 \pm 0.11$	$0.02 \pm 0.01$	$0.02 \pm 0.04$
	$Z \rightarrow \nu \nu$	$1.87 \pm 0.04$	$0.45 \pm 0.02$	0.23 ± 0.01
	Inclusve 1 lepton	0.41 ± 0.11	$0.01 \pm 0.01$	$0.02 \pm 0.04$
	1 lepton, from W			
$t\bar{t}+W$	1 lepton, from t	_	_	_
	≥ 2 leptons	$0.41 \pm 0.11$	$0.01 \pm 0.01$	$0.02 \pm 0.04$
	$Z \rightarrow \nu \nu$			
	Inclusve	$0.32 \pm 0.11$	_	$0.02 \pm 0.04$
	1 lepton	_	_	_
$t\bar{t} + W \rightarrow \ell\nu$ , amenlo pythia8	1 lepton, from W	_	_	_
. , , , , , , , , , , , , , , , , , , ,	1 lepton, from t	0.32 ± 0.11	_	
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	0.32 ± 0.11		0.02 ± 0.04
<u> </u>	$L \rightarrow \nu \nu$	_		ntinued on next page
			C01	on next page

	Table 1 – continued from			
		2jets	2jets	2jets
Sample	Classification	modTopness≥ 6.4	modTopness≥ 6.4	modTopness≥ 6.4
		250 < MET < 350	350 < MET < 450	MET > 450
	Inclusve	$0.08 \pm 0.04$	$0.01 \pm 0.01$	_
	1 lepton	_	<u> </u>	<u> </u>
	1 lepton, from W	_	<u> </u>	<u> </u>
$t\bar{t} + W \rightarrow QQ$ , amcnlo pythia8	1 lepton, from $t$	_	_	_
	> 2 leptons	$0.08 \pm 0.04$	$0.01 \pm 0.01$	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$1.88 \pm 0.04$	$0.45 \pm 0.02$	$0.23 \pm 0.01$
	1 lepton	$0.00 \pm 0.00$	<u> </u>	_
$t\bar{t}+Z$	1 lepton, from W	_	<u> </u>	_
tt + Z	1 lepton, from $t$	$0.00 \pm 0.00$	_	_
	≥ 2 leptons	$0.01 \pm 0.00$	$0.00 \pm 0.00$	_
	$Z \rightarrow \nu \nu$	$1.87 \pm 0.04$	$0.45 \pm 0.02$	$0.23 \pm 0.01$
	Inclusve	$1.88 \pm 0.04$	$0.45 \pm 0.02$	$0.23 \pm 0.01$
	1 lepton	$0.00 \pm 0.00$	<u> </u>	_
$t\bar{t} + Z$ , madgraph	1 lepton, from W	_	<u> </u>	_
tt + Z, madgraph	1 lepton, from $t$	$0.00 \pm 0.00$	<del>-</del>	_
	≥ 2 leptons	$0.01 \pm 0.00$	$0.00 \pm 0.00$	_
	$Z \rightarrow \nu \nu$	$1.87 \pm 0.04$	$0.45 \pm 0.02$	$0.23 \pm 0.01$
	Inclusve	$0.08 \pm 0.07$	_	_
	1 lepton	_	<del>-</del>	_
$t\bar{t} + Z \rightarrow QQ$ , amenlo pythia8	1 lepton, from W	_	<del>-</del>	_
tt + 2 - QQ, amenio pytinao	1 lepton, from $t$	_	<del>-</del>	_
	≥ 2 leptons	$0.08 \pm 0.07$	<del>-</del>	_
	$Z \rightarrow \nu \nu$	_	<u> </u>	_
	Inclusve	$1.77 \pm 0.26$	$0.76 \pm 0.17$	$0.27 \pm 0.08$
	1 lepton	_	_	_
$t\bar{t} + Z \rightarrow 2\ell 2\nu$ , amenlo pythia8	1 lepton, from W	_	<u> </u>	_
tt + 2 - 2c2v, amenio pytinao	1 lepton, from $t$	_	<u> </u>	_
	$\geq 2$ leptons	_	$0.09 \pm 0.09$	_
	$Z \rightarrow \nu \nu$	$1.77 \pm 0.26$	$0.66 \pm 0.14$	$0.27 \pm 0.08$

SR, Nominal Systematic, Yield Table for Input Samples

Sample Classification $MT2^2W \ge 200$ $MET < 550$ $M$	S	K, Nominal Systemati	c, Yield Table for Input			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			3jets	3jets	3jets	3jets
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Sample	Classification				
All Background $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			250 < MET < 350	350 < MET < 450	450 < MET < 550	MET > 550
All Background $ \begin{array}{c} 1 \; \text{lepton} \\ 1 \; \text{lepton} \\ 1 \; \text{lognom} \\ 1 \; \text{lepton} \\ 23.70 \pm 3.79 \\ 23.70 \pm 3.19 \\ 51.2 \pm 147 \\ 51.2 $	Data, single $e/\mu$ , MET	Inclusve	$63.00 \pm 7.94$	$15.00 \pm 3.87$	$9.00 \pm 3.00$	$4.00 \pm 2.00$
All Background $ \begin{array}{c} 1 \; \text{lepton} \\ 1 \; \text{lepton} \\ 1 \; \text{lognom} \\ 1 \; \text{lepton} \\ 23.70 \pm 3.79 \\ 23.70 \pm 3.19 \\ 51.2 \pm 147 \\ 51.2 $		Ingluare	74.07 ± 4.06	14.01 ± 1.84	5 67 ± 1 12	2 91 1 0 06
All Background     1 lepton, from W   23.70 ± 3.97   5.12 ± 1.47   2.44 ± 0.87   2.00 ± 0.02   0.32 ± 0.13   0.00 ± 0.00 ± 0.00   0.00 ± 0.00 ± 0.00 ± 0.00   0.00 ± 0.00						
All assegration $2 + 1$ lepton, from $t = 2 + 1$ lepton $t = 1 + 1$ lepton, from $t = 1 + 1$ lepton, from $t = 1 + 1$ lepton, from $t = 1 + 1$ lepton $t = 1 + 1$ lepton, from $t = 1 + 1$ lepton $t = 1 + 1$ lepton, from $t = 1 + 1$ lepton $t = 1 + 1$ lepton, from $t = 1 + 1 + 1$ lepton, from $t = 1 + 1 + 1$ lepton, from $t = 1 + 1 + 1$ lepton, from $t = 1 + 1 + 1$ lepton, from $t = 1 + 1 + 1$ lepton, from $t = 1 + 1 + 1$ lepton, from $t = 1 + 1 + 1$ lepton, from						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	All Background					2.00 ± 0.92
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						0.42 ± 0.16
$tf \\ tf \\$						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				5.30 ± 0.63	0.99 ± 0.38	0.28 ± 0.11
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			0.23 ± 0.13	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$tar{t}$		0.22 ± 0.12	_	_	_
tt, single lepFromT, madgraph pythia8				5 20 ± 0.62	0.00 ± 0.28	0.28 ± 0.11
$t \bar{t}, \text{ single lepFromT, madgraph pythia8} \\ \begin{array}{c} & \text{Inclusve} \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ 1 \text{ lepton, from } t \\ 2 \text{ lepton, from } t \\ 1 \text{ lepton, from } t \\ 1 \text{ lepton, from } t \\ 2 \text{ leptons} \\ 1 \text{ lepton, from } t \\ 2  $			33.82 ± 1.81	3.30 ± 0.03	0.99 ± 0.36	0.28 ± 0.11
$t \bar{t}, \text{ single lepFromT, madgraph pythia8} \\ \begin{array}{c} 1 \text{ lepton, from } w \\ 1 \text{ lepton, from } w \\ 2 \text{ leptons} \\ \hline \\ t \bar{t}, \text{ single lepFromTbar, madgraph pythia8, ext1} \\ \\ t \bar{t}, \text{ single lepFromTbar, madgraph pythia8, ext1} \\ \\ t \bar{t}, \text{ single lepFromTbar, madgraph pythia8, ext1} \\ \\ t \bar{t}, \text{ single lepFromTbar, madgraph pythia8, ext1} \\ \\ t \bar{t}, \text{ single lepFromTbar, madgraph pythia8, ext1} \\ \\ t \bar{t}, \text{ diLepton, from } w \\ 1 \text{ lepton, from } w \\ 2 \text{ leptons} & $				_		
$t f_{i}, single lepFromT, madgraph pythia8                                    $			<del>-</del>	_	_	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			<del>-</del>	_	_	_
t f, single lepFromTbar, madgraph pythia8, ext1	$t\bar{t}$ , single lepFromT, madgraph pythia8		_	_	_	_
			_	_	_	_
$t \bar{t}, \text{ single lepFromTbar, madgraph pythia8, ext1} \\ \begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons, from } W \\ 2 \text{ leptons, from } W \\ 2 \text{ lepton, madgraph pythia8, ext1} \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ 2 \text{ leptons, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons, from } W \\ 2 \text{ leptons, from } W \\ 2 \text{ leptons, from } W \\ 2 \text{ leptons} \\ 2 \text{ lepton, from } W \\ 2 \text{ leptons} \\ $		≥ 2 leptons	_	_	_	_
$t \bar{t}, \text{ single lepFromTbar, madgraph pythia8, ext1} \\ 1 \text{ lepton, from } t \\ 2 \text{ leptons } t \\ 2 \text{ leptons } t \\ 2 \text{ lepton some } t \\ 2 \text{ leptons} \\ 2  - \nu \nu \\ 1 \text{ lepton, from } t \\ 2 \text{ leptons } t \\ 2 \text{ leptons} \\ 2  - \nu \nu \\ 1 \text{ lepton, from } t \\ 2 \text{ leptons } t \\ 2 \text{ lepton } t \\ 2 $			0.22 ± 0.12	_	_	
$t \bar{t}, \text{ single lepFromTbar, madgraph pythia8, ext1} & 1   \text{lepton, from } W \\ 1   \text{lepton, from } W \\ 2   \text{leptons} \\ Z - \nu \nu \\ \hline \\ t \bar{t}, \text{ diLepton, madgraph pythia8, ext1} & 1   \text{lepton, from } W \\ 1   lep$				_	_	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			$0.23 \pm 0.13$	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$t\bar{t}$ , single lepFromTbar, madgraph pythia8, ext1			_	_	_
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	, , , , , , , , , , , , , , , , , , , ,		$0.23 \pm 0.13$	_	_	_
$t\bar{t},  \text{diLepton, madgraph pythia8, ext1} \\ \begin{array}{c} & \text{Inclusve} \\ 1   \text{lepton, from } W \\ -1   \text{lepton, from } W \\ -2   \text{lepton } t \\ -2   \text{lepton } t \\ -2   \text{lepton} t \\ -2   \text{lepton, from } W \\ -$			<del>-</del>	_	_	_
$t\bar{t},  \text{diLepton, madgraph pythia8, ext1}  \begin{array}{c ccccccccccccccccccccccccccccccccccc$					_	
$t\bar{t},  \text{diLepton, madgraph pythia8, ext1} \\ \begin{array}{c} 1   \text{lepton, from } t \\ \geq 2  \text{leptons} \\ Z \rightarrow \nu \nu \\ \\ \text{single } t \\ \text{single } t \\ $			$35.82 \pm 1.81$	5.30 ± 0.63	0.99 ± 0.38	$0.28 \pm 0.11$
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			<del>-</del>	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$t\bar{t}$ , diLepton, madgraph pythia8, ext1		<del>-</del>	_	_	_
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	, , , , , , , , , , , , , , , , , , , ,					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			$35.82 \pm 1.81$	$5.30 \pm 0.63$	$0.99 \pm 0.38$	$0.28 \pm 0.11$
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			<del>_</del>			_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				$1.05 \pm 0.74$	$0.38 \pm 0.38$	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				_	_	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	single t		$0.70 \pm 0.70$	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				I	l <del></del>	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			$6.36 \pm 2.21$	$1.05 \pm 0.74$	$0.38 \pm 0.38$	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			<del>-</del>			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				$1.05 \pm 0.74$	$0.38 \pm 0.38$	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				_	_	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	single $t$ $t - W$ -channel			_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				_	<u> </u>	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		≥ 2 leptons		$1.05 \pm 0.74$	$0.38 \pm 0.38$	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				_	_	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				_	_	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	-	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	single t, t - W-channel, powheg pythia8		_	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	G ,		_	_	_	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			<del></del>	_		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				$1.05 \pm 0.74$	$0.38 \pm 0.38$	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				_	_	-
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	single $\bar{t} = t - W_{*}$ channel nowheg nythia8		$0.70 \pm 0.70$	_	_	-
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	omate o, o we-channel, powneg pythiao		<del>-</del>	_	_	-
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			$6.36 \pm 2.21$	$1.05 \pm 0.74$	$0.38 \pm 0.38$	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			<u> </u>			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				_		_
single $t$ non $t-W$ -channel 1 lepton, from $t$			_	_	_	_
1 lepton, from $t$						
	single t non t W shannel		_	_	_	_
Z  ightarrow  u  u  u  u  u  u  u  u  u  u  u  u  u	single  t  non  t-W-channel	1 lepton, from $W$ 1 lepton, from $t$		_		_
	${\rm single}\ t\ {\rm non}\ t-W\text{-}{\rm channel}$	1 lepton, from $W$ 1 lepton, from $t$ $\geq$ 2 leptons	_ _ _	_ _ _		_ _ _

Table 2 - continued from previous page

	Table 2 – contii	nued from previous pa			
		3jets	3jets	3jets	3jets
Sample	Classification	MT2W≥200	$MT2W \ge 200$	$MT2W \ge 200$	$MT2W \ge 200$
		250 < MET < 350	350 < MET < 450	450 < MET < 550	MET > 550
	Inclusve				
	1 lepton				
	1 lepton, from W	_	_	_	<del></del> -
single t, s-channel, amcnlo pythia8		_	_	_	_
	1 lepton, from t	_	_	_	_
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$		<del>-</del>	<u> </u>	_
	Inclusve	$21.46 \pm 3.84$	$4.84 \pm 1.47$	$2.02 \pm 0.78$	$1.88 \pm 0.92$
	1 lepton	$21.46 \pm 3.84$	$4.84 \pm 1.47$	$2.02 \pm 0.78$	$1.88 \pm 0.92$
V+Jets	1 lepton, from W	$21.46 \pm 3.84$	$4.84 \pm 1.47$	$2.02 \pm 0.78$	$1.88 \pm 0.92$
1 000	1 lepton, from $t$	_	_	_	_
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	<u> </u>	_
	Inclusve	_	_	_	_
	1 lepton	_	_	_	_
Darie de	1 lepton, from W	_	_	_	_
$\mathrm{DY} + \mathrm{Jets} \rightarrow \ell\ell$	1 lepton, from t	_	_	_	_
	> 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	_	_		
	1 lepton	_	_	_	_
	1 lepton, from W	_	_	_	_
DY+Jets→ ℓℓ, M10to50, amcnlo pythia8	1 lepton, from t	_	_	_	_
	> 2 leptons	_	_	<del>_</del>	_
	$Z \rightarrow \nu \nu$	_			_
				<del>_</del>	
	Inclusve	_	_	_	_
	1 lepton	_	_	_	_
DY+Jets→ ℓℓ, M50, amenlo pythia8	1 lepton, from W	_	_	_	_
	1 lepton, from t	_	_	_	_
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	$21.46 \pm 3.84$	$4.84 \pm 1.47$	$2.02 \pm 0.78$	$1.88 \pm 0.92$
	1 lepton	$21.46 \pm 3.84$	$4.84 \pm 1.47$	$2.02 \pm 0.78$	$1.88 \pm 0.92$
W+Jets $\rightarrow \ell \nu$	1 lepton, from W	$21.46 \pm 3.84$	$4.84 \pm 1.47$	$2.02 \pm 0.78$	$1.88 \pm 0.92$
W + 3C63 - 7 CD	1 lepton, from $t$	_	_	<u> </u>	_
	$\geq 2$ leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	<del>-</del>	_
	Inclusve	$1.11 \pm 1.11$	_	_	$0.70 \pm 0.70$
	1 lepton	$1.11 \pm 1.11$	_	_	$0.70 \pm 0.70$
W   1-4-	1 lepton, from W	$1.11 \pm 1.11$	_	_	$0.70 \pm 0.70$
W+Jets $\rightarrow \ell \nu$ , 100 $<$ $HT$ $<$ 200, madgraph pythia8	1 lepton, from t	_	_	_	_
	> 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	l —
	Inclusve	7.83 ± 2.23	$0.94 \pm 0.94$	$0.82 \pm 0.58$	$0.55 \pm 0.55$
	1 lepton	7.83 ± 2.23	0.94 ± 0.94	$0.82 \pm 0.58$	$0.55 \pm 0.55$
	1 lepton, from W	7.83 ± 2.23	0.94 ± 0.94	$0.82 \pm 0.58$ $0.82 \pm 0.58$	$0.55 \pm 0.55$
W+Jets $\rightarrow \ell \nu$ , 200 $< HT < 400$ , madgraph pythia8	1 lepton, from t	1 ± 2.20	I 3.01 ± 3.01	1 0.02 ± 0.00	
	> 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	$Z \rightarrow \nu \nu$ Inclusve	8.45 ± 2.81	1.70 ± 1.00	$0.43 \pm 0.43$	_
					_
	1 lepton	$8.45 \pm 2.81$	$1.70 \pm 1.00$	$0.43 \pm 0.43$	_
W+Jets $\rightarrow \ell \nu$ , 400 < HT < 600, madgraph pythia8	1 lepton, from W	$8.45 \pm 2.81$	$1.70 \pm 1.00$	$0.43 \pm 0.43$	_
. , , ,	1 lepton, from t	_	_	_	_
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$		<u> </u>	<u> </u>	
	Inclusve	$1.49 \pm 0.48$	$1.02 \pm 0.28$	$0.45 \pm 0.25$	$0.27 \pm 0.19$
	1 lepton	$1.49 \pm 0.48$	$1.02 \pm 0.28$	$0.45 \pm 0.25$	$0.27 \pm 0.19$
W+Jets $\rightarrow \ell \nu$ , 600 < HT < 800, madgraph pythia8	1 lepton, from W	$1.49 \pm 0.48$	$1.02 \pm 0.28$	$0.45 \pm 0.25$	$0.27 \pm 0.19$
w ⊤Jets→ εν, συσ < n 1 < συσ, madgraph pythias	1 lepton, from t	_	_	_	_
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	1			Continue	d on next page
				Continue	next page

Table 2 - continued from previous page

	Table 2 – contir	ued from previous pa			
		3jets	3jets	3jets	3jets
Sample	Classification	$MT2W \ge 200$	MT2W≥200	MT2W≥200	$MT2W \ge 200$
		250 < MET < 350	350 < MET < 450	450 < MET < 550	MET > 550
	Inclusve	$1.58 \pm 0.27$	$0.54 \pm 0.14$	$0.17 \pm 0.06$	$0.28 \pm 0.07$
	1 lepton	$1.58 \pm 0.27$	$0.54 \pm 0.14$	$0.17 \pm 0.06$	$0.28 \pm 0.07$
	1 lepton, from W	$1.58 \pm 0.27$ $1.58 \pm 0.27$	$0.54 \pm 0.14$ $0.54 \pm 0.14$	$0.17 \pm 0.06$ $0.17 \pm 0.06$	$0.28 \pm 0.07$
W+Jets $\rightarrow \ell \nu$ , 800 $< HT < 1200$ , madgraph pythia8	1 lepton, from t	1.00 ± 0.21	0.04 ± 0.14	0.17 ± 0.00	0.20 ± 0.07
	> 2 leptons				
	$Z \rightarrow \nu \nu$		_	<del>_</del>	_
	Inclusve	0.98 ± 0.58	$0.59 \pm 0.42$	$0.15 \pm 0.10$	$0.06 \pm 0.06$
	1 lepton	$0.98 \pm 0.58$ $0.98 \pm 0.58$	$0.59 \pm 0.42$ $0.59 \pm 0.42$	$0.15 \pm 0.10$ $0.15 \pm 0.10$	$0.06 \pm 0.06$ $0.06 \pm 0.06$
W+Jets $\rightarrow \ell \nu$ , 1200 < HT < 2500, madgraph pythia8	1 lepton, from W	$0.98 \pm 0.58$	$0.59 \pm 0.42$	$0.15 \pm 0.10$	$0.06 \pm 0.06$
	1 lepton, from t	_	_	_	_
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$			_	
	Inclusve	$0.03 \pm 0.02$	$0.04 \pm 0.02$	$0.00 \pm 0.00$	$0.02 \pm 0.01$
	1 lepton	$0.03 \pm 0.02$	$0.04 \pm 0.02$	$0.00 \pm 0.00$	$0.02 \pm 0.01$
W+Jets $\rightarrow \ell \nu$ , 2500 $< HT < Inf$ , madgraph pythia8	1 lepton, from W	$0.03 \pm 0.02$	$0.04 \pm 0.02$	$0.00 \pm 0.00$	$0.02 \pm 0.01$
. , , , , , , , , , , , , , , , , , , ,	1 lepton, from t	<del></del>	_	<del>-</del>	_
	≥ 2 leptons	<del></del>	_	<del>-</del>	_
	$Z \rightarrow \nu \nu$	<del>_</del>		<u> </u>	
	Inclusve	$9.50 \pm 1.10$	$2.82 \pm 0.54$	$2.29 \pm 0.62$	$0.66 \pm 0.25$
	1 lepton	$1.54 \pm 0.76$	$0.28 \pm 0.09$	$0.42 \pm 0.39$	$0.12 \pm 0.04$
Rare	1 lepton, from W	$1.54 \pm 0.76$	$0.28 \pm 0.09$	$0.42 \pm 0.39$	$0.12 \pm 0.04$
Itare	1 lepton, from t	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	_
	$\geq$ 2 leptons	$1.99 \pm 0.48$	$0.42 \pm 0.23$	$0.26 \pm 0.26$	$0.14 \pm 0.11$
	$Z \rightarrow \nu \nu$	$5.97 \pm 0.63$	$2.12 \pm 0.48$	$1.61 \pm 0.40$	$0.39 \pm 0.22$
	Inclusve	$4.79 \pm 1.08$	$1.24 \pm 0.51$	$1.88 \pm 0.62$	$0.39 \pm 0.25$
	1 lepton	$1.54 \pm 0.76$	$0.25 \pm 0.09$	$0.42 \pm 0.39$	$0.10 \pm 0.04$
U.D.	1 lepton, from W	$1.54 \pm 0.76$	$0.25 \pm 0.09$	$0.42 \pm 0.39$	$0.10 \pm 0.04$
diBoson	1 lepton, from t		_	_	_
	> 2 leptons	$1.36 \pm 0.44$	$0.21 \pm 0.15$	$0.26 \pm 0.26$	$0.13 \pm 0.11$
	$Z \rightarrow \nu \nu$	$1.90 \pm 0.63$	$0.78 \pm 0.48$	$1.19 \pm 0.40$	$0.16 \pm 0.22$
	Inclusve	2.31 ± 0.86	$0.21 \pm 0.15$	$0.65 \pm 0.47$	$0.10 \pm 0.10$
	1 lepton	$1.05 \pm 0.75$	0.21 ± 0.10	0.39 ± 0.39	- 0.10
	1 lepton, from W	1.05 ± 0.75	_	0.39 ± 0.39	_
WW	1 lepton, from t	- 0.10	_	0.00 ± 0.00	_
	> 2 leptons	$1.26 \pm 0.43$	$0.21 \pm 0.15$	$0.26 \pm 0.26$	$0.10 \pm 0.10$
	$Z \rightarrow \nu \nu$	1.20 ± 0.43	0.21 ± 0.10	0.20 ± 0.20	0.10 ± 0.10
	Inclusve	$1.26 \pm 0.43$	$0.21 \pm 0.15$	0.26 ± 0.26	$0.10 \pm 0.10$
	1 lepton	1.20 ± 0.43	0.21 ± 0.13	0.20 ± 0.20	0.10 ± 0.10
		<del>-</del>	_	<del>-</del>	_
$WW \rightarrow 2\ell 2\nu$ , powheg	1 lepton, from W	_	_	_	_
	1 lepton, from t	1 26 ± 0 42	0.21 ± 0.15	0.26 ± 0.26	0.10 ± 0.10
	≥ 2 leptons	$1.26 \pm 0.43$	$0.21 \pm 0.15$	$0.26 \pm 0.26$	$0.10 \pm 0.10$
	$Z \rightarrow \nu \nu$		_		
	Inclusve	$1.05 \pm 0.75$	_	0.39 ± 0.39	_
	1 lepton	$1.05 \pm 0.75$	_	$0.39 \pm 0.39$	_
$WW \rightarrow \ell \nu qq$ , powheg	1 lepton, from W	$1.05 \pm 0.75$	_	$0.39 \pm 0.39$	_
*** 1	1 lepton, from t	<del>-</del>	_	_	_
	≥ 2 leptons	_	_	_	_
			_	_	_
	$Z \rightarrow \nu \nu$				
	Inclusve	2.42 ± 0.65	$0.99 \pm 0.48$	$1.21 \pm 0.40$	$0.26 \pm 0.22$
	Inclusve 1 lepton	$0.48 \pm 0.14$	$0.25 \pm 0.09$	$0.03 \pm 0.04$	$0.10 \pm 0.04$
WZ	$\begin{array}{c} \text{Inclusve} \\ \text{1 lepton} \\ \text{1 lepton, from } W \end{array}$				
WZ	Inclusve 1 lepton	$\begin{array}{c} 0.48 \pm 0.14 \\ 0.48 \pm 0.14 \\ \end{array}$	$0.25 \pm 0.09$	$0.03 \pm 0.04$	$0.10 \pm 0.04$
WZ	$\begin{array}{c} \text{Inclusve} \\ \text{1 lepton} \\ \text{1 lepton, from } W \end{array}$	$0.48 \pm 0.14$	$0.25 \pm 0.09$	$\begin{array}{c} 0.03  \pm  0.04 \\ 0.03  \pm  0.04 \end{array}$	$0.10 \pm 0.04$
WZ	Inclusve $1 \text{ lepton}$ $1 \text{ lepton, from } W$ $1 \text{ lepton, from } t$	$\begin{array}{c} 0.48 \pm 0.14 \\ 0.48 \pm 0.14 \\ \end{array}$	$0.25 \pm 0.09$	$\begin{array}{c} 0.03  \pm  0.04 \\ 0.03  \pm  0.04 \end{array}$	$0.10 \pm 0.04$
WZ	Inclusve 1 lepton 1 lepton, from $W$ 1 lepton, from $t$ $\geq$ 2 leptons	$\begin{array}{c} 0.48 \pm 0.14 \\ 0.48 \pm 0.14 \\$	$\begin{array}{c} 0.25 \pm 0.09 \\ 0.25 \pm 0.09 \\$	$0.03 \pm 0.04 \\ 0.03 \pm 0.04 \\$	$0.10 \pm 0.04$ $0.10 \pm 0.04$ $-$
W Z	Inclusve 1 lepton 1 lepton, from $W$ 1 lepton, from $t \ge 2$ leptons $D \to \nu \nu$	$\begin{array}{c} 0.48 \pm 0.14 \\ 0.48 \pm 0.14 \\ \\ 0.10 \pm 0.07 \\ 1.84 \pm 0.63 \end{array}$	$\begin{array}{c} 0.25 \pm 0.09 \\ 0.25 \pm 0.09 \\$	$0.03 \pm 0.04 \\ 0.03 \pm 0.04 \\$	$0.10 \pm 0.04$ $0.10 \pm 0.04$ $-$
	$ \begin{array}{c} \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \text{Inclusve} \\ 1 \text{ lepton} \end{array} $	$\begin{array}{c} 0.48 \pm 0.14 \\ 0.48 \pm 0.14 \\ \\ 0.10 \pm 0.07 \\ 1.84 \pm 0.63 \end{array}$	$\begin{array}{c} 0.25 \pm 0.09 \\ 0.25 \pm 0.09 \\$	$0.03 \pm 0.04 \\ 0.03 \pm 0.04 \\$	$0.10 \pm 0.04$ $0.10 \pm 0.04$ $-$
$WZ$ $WZ \!\to\! 3\ell\nu,  {\rm powheg  pythia8}$	Inclusve 1 lepton 1 lepton, from $W$ 1 lepton, from $t \ge 2$ leptons $Z \to \nu \nu$ Inclusve	$\begin{array}{c} 0.48 \pm 0.14 \\ 0.48 \pm 0.14 \\ \\ 0.10 \pm 0.07 \\ 1.84 \pm 0.63 \end{array}$	$\begin{array}{c} 0.25 \pm 0.09 \\ 0.25 \pm 0.09 \\$	$\begin{array}{c} 0.03 \pm 0.04 \\ 0.03 \pm 0.04 \\ & - \\ - \\ 1.18 \pm 0.40 \\ & - \\ - \end{array}$	$0.10 \pm 0.04$ $0.10 \pm 0.04$ $-$
	$ \begin{array}{c} \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ \overline{Z} \rightarrow \nu \nu \\ \hline \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \end{array} $	$\begin{array}{c} 0.48 \pm 0.14 \\ 0.48 \pm 0.14 \\ \hline 0.10 \pm 0.07 \\ 1.84 \pm 0.63 \\ \hline 0.10 \pm 0.07 \\ \hline \\ \end{array}$	$\begin{array}{c} 0.25 \pm 0.09 \\ 0.25 \pm 0.09 \\$	$\begin{array}{c} 0.03 \pm 0.04 \\ 0.03 \pm 0.04 \\ & - \\ & - \\ 1.18 \pm 0.40 \\ & - \\ & - \\ & - \\ & - \\ \end{array}$	$0.10 \pm 0.04$ $0.10 \pm 0.04$ $-$
	$ \begin{array}{c} \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \text{Inclusve} \\ 1 \text{ lepton, from } W \\ \end{array} $	$\begin{array}{c} 0.48 \pm 0.14 \\ 0.48 \pm 0.14 \\ \\ 0.10 \pm 0.07 \\ 1.84 \pm 0.63 \end{array}$	$\begin{array}{c} 0.25 \pm 0.09 \\ 0.25 \pm 0.09 \\$	$\begin{array}{c} 0.03 \pm 0.04 \\ 0.03 \pm 0.04 \\ & - \\ & - \\ 1.18 \pm 0.40 \\ & - \\ & - \\ & - \\ & - \\ \end{array}$	$0.10 \pm 0.04$ $0.10 \pm 0.04$ $-$

Table 2 - continued from previous page

Sample Classification $MT2W \ge 200$		Table 2 - contil	nued from previous pa			
			3jets	3jets	3jets	3jets
Inclusive   1   lepton   1	Sample	Classification				$MT2W \ge 200$
			250 < MET < 350	350 < MET < 450	450 < MET < 550	MET > 550
		T1				
			_	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$WZ \rightarrow 2\ell 2Q$ , amenlo pythia8		_	_	_	_
	13		_	_	_	_
			_	_	_	_
$WZ \rightarrow t\nu 2Q, \text{ amenlo pythiaS} \qquad \begin{array}{c} 1 \text{ lepton} & 0.48 \pm 0.14 \\ 1 \text{ lepton, from } \nu \\ 2  John the control of the cont$			_	_	_	_
$WZ \rightarrow t \nu 2Q, \text{ amenio pythia8} \qquad \begin{array}{c} 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ 1 \text{ lepton, from } V \\ 2 \text{ lepton } \\ 1 \text{ lepton, from } V \\ 1  $		Inclusve		$0.25 \pm 0.09$	$0.03 \pm 0.04$	$0.10 \pm 0.04$
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		1 lepton	$0.48 \pm 0.14$	$0.25 \pm 0.09$	$0.03 \pm 0.04$	$0.10 \pm 0.04$
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	11.7. 4.00 1 11.0	1 lepton, from W	$0.48 \pm 0.14$	$0.25 \pm 0.09$	$0.03 \pm 0.04$	$0.10 \pm 0.04$
	$WZ \rightarrow \ell \nu ZQ$ , amenio pytnias	1 lepton, from t	_	_	_	_
		> 2 leptons	_	<u> </u>	<u> </u>	_
			_	_	_	_
$WZ \rightarrow 163\nu,  \mathrm{amenlo}  \mathrm{pythia8} \\ \begin{array}{c} 1   \mathrm{lepton},  \mathrm{from}                   $			$1.84 \pm 0.63$	$0.73 \pm 0.48$	$1.18 \pm 0.40$	$0.15 \pm 0.22$
$ VZ \rightarrow 1\ell 3\nu \text{, amenlo pythia8} \\ \begin{array}{c} 1 \text{ lepton, from } \\ 2 \text{ leptons} \\ Z \rightarrow \nu \\ \\ ZZ \\ ZZ \\ ZZ \\ ZZ \\ ZZ \\ ZZ$						
	$WZ \rightarrow 1\ell 3\nu$ , amcnlo pythia8		_	_	_	_
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			_	_	_	
$ZZ = 1 \text{ lincluse} \\ 2Z = 1 \text{ lincluse} \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ Z = \nu \nu \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ Z = \nu \nu \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ 2 \text{ leptons} \\ 2 \text{ leptons} \\ 2 \text{ leptons} \\ 2 \text{ lepton, from } W \\ 1  lepton,$			1 84 ± 0.62	0.72 ± 0.48	1 18 ± 0 40	0.15 ± 0.22
$ZZ = \begin{array}{c ccccccccccccccccccccccccccccccccccc$						
$ ZZ = \begin{cases} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ 0.06 \pm 0.01 \\ 0.05 \pm 0.01 \\ 0.05 \pm 0.01 \\ 0.05 \pm 0.01 \\ 0.01 \pm 0.00 \\ 0.01 \pm 0.00 \\ 0.02 \pm 0.02 \\ $			0.06 ± 0.02	0.05 ± 0.01	0.01 ± 0.00	$0.03 \pm 0.02$
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_	_
$ZZ \to 2\ell 2Q, \text{ amenlo pythia8} \\ ZZ \to 2\ell 2Q, \text{ powheg pythia8} $	ZZ		_	_	_	_
$ ZZ \rightarrow 2\ell 2Q, \text{ amenlo pythia8} \\                                   $	22		_	_	_	_
$ZZ \to 2\ell 2Q, \text{ amenlo pythia8} \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_	
$ ZZ \rightarrow 2\ell 2Q, \text{ amenlo pythia8} \\  \begin{array}{c} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\  \end{array} \\  \begin{array}{c} I \text{ lepton, from } W \\ 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\  \end{array} \\  \begin{array}{c} I \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 3 \text{ lepton, from } W \\ 4 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 3 \text{ lepton, from } W \\ 4 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 3 \text{ lepton, from } W \\ 4  lepto$		$Z \rightarrow \nu \nu$	$0.06 \pm 0.01$	$0.05 \pm 0.01$	$0.01 \pm 0.00$	$0.01 \pm 0.00$
$ ZZ \rightarrow 2\ell 2Q, \text{ amenlo pythia8} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } t \\ 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \end{array} \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } t \\ 1 \text{ lepton, from } W \\ \end{array} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 2 \text{ leptons, from } W \\ \end{array} \\ \begin{array}{c} 2 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 2 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 2 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 2 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 2 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 2 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 2 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} 2 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} $		Inclusve	_	_	_	$0.02 \pm 0.02$
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		1 lepton	_	_	_	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	77 0400 1 1110	1 lepton, from W	_	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ZZ \rightarrow 2\ell 2Q$ , amenlo pythia8		_	_	_	_
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			_	_	_	$0.02 \pm 0.02$
$ZZ \rightarrow 2\ell 2\nu, \text{ powheg pythia8} \\ \begin{array}{c} \text{Incluse} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ - \\ 1 \text{ lepton, from } W \\ - \\ 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ - \\ 1 \text{ lepton, from } W \\ - \\ 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \end{array} \\ \begin{array}{c} 2 \text{ lepton, from } W \\ - \\ 1 \text{ lepton, from } W \\ - \\ 2 \text{ leptons} \\ - \\ 2 \text{ leptons} \\ \end{array} \\ \begin{array}{c} 2 \text{ leptons} \\ - \\ 2 \text{ leptons} \\ \end{array} \\ \begin{array}{c} 0.06 \pm 0.01 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ $						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			0.06 ± 0.01	0.04 ± 0.01	0.01 ± 0.00	0.01 ± 0.00
$ ZZ \rightarrow 2\ell 2\nu \text{, powheg pythia8} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \end{array} \\ \begin{array}{c} - \\ 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ \end{array} \\ \begin{array}{c} - \\ 2 \text{ leptons} \\ \end{array} \\ \begin{array}{c} - \\ - \\ - \\ - \\ \end{array} \\ \end{array} \\ \begin{array}{c} - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - $			0.00 ± 0.01	0.04 ± 0.01	0.01 ± 0.00	0.01 ± 0.00
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ZZ \rightarrow 2\ell 2\nu$ , powheg pythia8		_	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_	_
$ZZ \rightarrow 2Q2\nu,  \mathrm{amcnlo\;pythia8} \\ \begin{array}{c} & \text{Inclusve} \\ 1                  $						0.01   0.00
$ ZZ \rightarrow 2Q2\nu,  \mathrm{amcnlo \; pythia8} \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$					0.01 ± 0.00	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			$0.01 \pm 0.01$	$0.01 \pm 0.01$	_	$0.00 \pm 0.00$
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ZZ \rightarrow 2O2\nu$ , amonlo pythia8		_	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_	_
$t\bar{t} + V \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	<u> </u>	_	_
$t\bar{t} + V = \begin{pmatrix} 1 & lepton & 0.00 \pm 0.00 & 0.03 \pm 0.03 & 0.00 \pm 0.00 & 0.02 \pm 0.02 \\ 1 & lepton, from W & - & 0.03 \pm 0.03 & - & 0.02 \pm 0.02 \\ 1 & lepton, from t & 0.00 \pm 0.00 & 0.00 \pm 0.00 & 0.00 \pm 0.00 & - \\ 2 & leptons & 0.64 \pm 0.20 & 0.22 \pm 0.17 & 0.00 \pm 0.03 & 0.02 \pm 0.02 \\ 2 & - \nu \nu & 4.07 \pm 0.05 & 1.33 \pm 0.03 & 0.41 \pm 0.02 & 0.23 \pm 0.01 \\ 1 & lepton & - & 0.03 \pm 0.03 & - & 0.02 \pm 0.02 \\ 1 & lepton, from W & - & 0.03 \pm 0.03 & - & 0.02 \pm 0.02 \\ 1 & lepton, from t & - & - & - & - & - & - \\ 2 & leptons & 0.61 \pm 0.20 & 0.22 \pm 0.17 & - & 0.02 \pm 0.02 \\ 2 & - \nu \nu & - & - & - & - & - & - \\ 1 & lepton & - & 0.61 \pm 0.20 & 0.22 \pm 0.17 & - & 0.02 \pm 0.02 \\ 2 & - \nu \nu & - & - & - & - & - & - \\ 1 & lepton & - & 0.03 \pm 0.03 & - & 0.02 \pm 0.02 \\ 1 & lepton & - & 0.03 \pm 0.03 & - & 0.02 \pm 0.02 \\ 1 & lepton & - & 0.03 \pm 0.03 & - & 0.02 \pm 0.02 \\ 1 & lepton, from W & - & 0.03 \pm 0.03 & - & 0.02 \pm 0.02 \\ 1 & lepton, from W & - & 0.03 \pm 0.03 & - & 0.02 \pm 0.02 \\ 1 & lepton, from W & - & 0.03 \pm 0.03 & - & 0.02 \pm 0.02 \\ 1 & lepton, from W & - & 0.03 \pm 0.03 & - & 0.02 \pm 0.02 \\ 2 & - \nu \nu & - & - & - & - & - & - & - \\ 2 & leptons & 0.50 \pm 0.18 & 0.20 \pm 0.17 & - & 0.02 \pm 0.02 \\ 2 & - \nu \nu & - & - & - & - & - & - & - \\ 0.50 \pm 0.18 & 0.20 \pm 0.17 & - & 0.02 \pm 0.02 \\ - & - & - & - & - & - & - & - \\ 0.03 \pm 0.03 & - & - & 0.02 \pm 0.02 \\ - & - & - & - & - & - & - & - \\ 0.02 \pm 0.02 \pm 0.02 \\ - & - & - & - & - & - & - \\ 0.02 \pm 0.02 \pm 0.02 \\ - & - & - & - & - & - & - \\ 0.02 \pm 0.02 \pm 0.02 \\ - & - & - & - & - & - \\ 0.02 \pm 0.02 \pm 0.02 \\ - & - & - & - & - & - \\ 0.02 \pm 0.02 \pm 0.02 \\ - & - & - & - & - \\ 0.03 \pm 0.03 \pm 0.03 \\ - & - & - & - & - \\ 0.02 \pm 0.02 \pm 0.02 \\ - & - & - & - & - \\ 0.02 \pm 0.02 \pm 0.02 \\ - & - & - & - \\ 0.03 \pm 0.03 \pm 0.03 \\ - & - & - & - \\ 0.02 \pm 0.02 \pm 0.02 \\ - & - & - & - \\ 0.03 \pm 0.03 \pm 0.03 \\ - & - & - & - \\ 0.02 \pm 0.02 \pm 0.02 \\ - & - & - & - \\ 0.03 \pm 0.03 \pm 0.03 \\ - & - & - & - \\ 0.02 \pm 0.02 \pm 0.02 \\ - & - & - & - \\ 0.03 \pm 0.03 \pm 0.03 \\ - & - & - & - \\ 0.02 \pm 0.02 \pm 0.02 \\ - & - & - & - \\ 0.03 \pm 0.03 \pm 0.03 \\ - & - & - & - \\ 0.03 \pm 0.03$						
$t\bar{t} + V \\ \begin{array}{c} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ 1 \text{ lepton, from } t \\ 1 \text{ lepton, from } t \\ 1 \text{ lepton, from } t \\ 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ 1 \text{ lepton, from } t \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ 2 \text{ leptons} \\ 2 \rightarrow \nu \nu \\ 1 \text{ lepton, from } t \\ 1 \text{ lepton, from } t \\ 2 \text{ leptons} \\ 2 \rightarrow \nu \nu \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ 2 \text{ leptons} \\ 2 \rightarrow \nu \nu \\ 1 \text{ lepton, from } W \\ 0.03 \pm 0.03 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ $						
$t\bar{t} + V \\ \begin{array}{c} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \end{array} \\ t\bar{t} + W \\ \begin{array}{c} 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ D \text{ look} \\ D \text{ lepton} \\ $		1 lepton	$0.00 \pm 0.00$	$0.03 \pm 0.03$	$0.00 \pm 0.00$	$0.02 \pm 0.02$
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	17 L 17	1 lepton, from W	_		_	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	tt + v		$0.00 \pm 0.00$		$0.00 \pm 0.00$	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						$0.02 \pm 0.02$
$t\bar{t} + W \rightarrow \ell\nu \text{, amenlo pythia8} \\ \begin{array}{c} \text{Inclusve} \\ 1 \text{ lepton} \\ 1  lep$						
$ t\bar{t} + W \qquad \begin{cases} & 1 \text{ lepton} \\ & 1 \text{ lepton, from } W \\ & 1 \text{ lepton, from } t \\ & \geq 2 \text{ leptons} \end{cases} \qquad \begin{array}{c} & 0.03 \pm 0.03 \\ & -0.03 \pm 0.0$						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			0.01 ± 0.20		_	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_		_	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$t\bar{t} + W$		_	0.03 ± 0.03	_	0.02 ± 0.02
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			0.61 + 0.20	0.22 ± 0.17	_	0.00 ± 0.00
$t\bar{t} + W \rightarrow \ell \nu \text{, amenlo pythia8} \\ \begin{array}{ccccccccccccccccccccccccccccccccccc$			0.61 ± 0.20	0.22 ± 0.17	_	$0.02 \pm 0.02$
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					_	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			$0.50 \pm 0.18$		_	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_		_	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$t\bar{t} + W \rightarrow \ell \nu$ , amonlo pythia8		_	$0.03 \pm 0.03$		$0.02 \pm 0.02$
Z  ightarrow  u  u  u  u  u  u  u  u  u  u  u  u  u	, amonto py mido		_	I —	_	_
			$0.50 \pm 0.18$		_	$0.02 \pm 0.02$
Continued on next page		Z  ightarrow  u  u	_	_	_	_
					Continue	d on next page

Table 2 - continued from previous page

	Table 2 - conti	nued from previous p	age		
Sample	Classification	3jets MT2W≥200	3jets MT2W≥200	3jets MT2W≥200	3jets MT2W≥200
		250 < MET < 350	350 < MET < 450	450 < MET < 550	MET > 550
	Inclusve	$0.11 \pm 0.10$	$0.02 \pm 0.02$	_	_
	1 lepton	_	_	_	_
$t\bar{t} + W \rightarrow QQ$ , amcolo pythia8	1 lepton, from W	_	_	_	_
$tt + W \rightarrow QQ$ , amenio pytnias	1 lepton, from t	_	_	_	_
	> 2 leptons	$0.11 \pm 0.10$	$0.02 \pm 0.02$	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	$4.10 \pm 0.06$	$1.34 \pm 0.03$	$0.41 \pm 0.02$	$0.23 \pm 0.01$
	1 lepton	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	_
$t\bar{t}+Z$	1 lepton, from W	_	_	_	_
tt + Z	1 lepton, from t	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	_
	≥ 2 leptons	$0.03 \pm 0.01$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	_
	$Z \rightarrow \nu \nu$	$4.07 \pm 0.05$	$1.33 \pm 0.03$	$0.41 \pm 0.02$	$0.23 \pm 0.01$
	Inclusve	$4.10 \pm 0.06$	$1.34 \pm 0.03$	$0.41 \pm 0.02$	$0.23 \pm 0.01$
	1 lepton	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	_
$t\bar{t} + Z$ , madgraph	1 lepton, from W	_	_	_	_
tt + Z, madgraph	1 lepton, from $t$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	_
	≥ 2 leptons	$0.03 \pm 0.01$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	_
	$Z \rightarrow \nu \nu$	$4.07 \pm 0.05$	$1.33 \pm 0.03$	$0.41 \pm 0.02$	$0.23 \pm 0.01$
	Inclusve	$0.04 \pm 0.08$	$0.02 \pm 0.02$	$0.02 \pm 0.02$	_
	1 lepton	_	_	_	_
$t\bar{t} + Z \rightarrow QQ$ , amenlo pythia8	1 lepton, from W	_	_	_	_
tt + 2→QQ, amenio pytinas	1 lepton, from $t$	_	_	_	_
	≥ 2 leptons	$0.04 \pm 0.08$	$0.02 \pm 0.02$	$0.02 \pm 0.02$	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	$3.05 \pm 0.42$	$1.40 \pm 0.23$	$0.48 \pm 0.12$	$0.27 \pm 0.07$
	1 lepton	_	_	_	_
$t\bar{t} + Z \rightarrow 2\ell 2\nu$ , amenlo pythia8	1 lepton, from W	_	_	_	_
tt + 2 - 2c2v, amenio pytinas	1 lepton, from $t$	_	_	_	_
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	$3.05 \pm 0.42$	$1.40 \pm 0.23$	$0.48 \pm 0.12$	$0.27 \pm 0.07$

SR, Nominal Systematic, Yield Table for Input Samples

Sample	Classification	≥4jets MT2W< 200	≥4jets MT2W< 200	≥4jets MT2W< 200
		250 < MET < 350	350 < MET < 450	MET > 450
Data, single $e/\mu$ , MET	Inclusve	$188.00 \pm 13.71$	$43.00 \pm 6.56$	$17.00 \pm 4.12$
	Inclusve	$317.27 \pm 6.04$	$48.88 \pm 2.09$	$13.10 \pm 0.93$
	1 lepton	$19.59 \pm 2.73$	$3.25 \pm 0.92$	$0.76 \pm 0.25$
All Background	1 lepton, from W	$9.64 \pm 2.22$	$1.71 \pm 0.71$	$0.30 \pm 0.10$
III Bucaground	1 lepton, from t	9.95 ± 1.59	$1.53 \pm 0.57$	$0.46 \pm 0.22$
	≥ 2 leptons	$290.11 \pm 5.36$	$43.95 \pm 1.87$	$12.00 \pm 0.90$
	$Z \rightarrow \nu \nu$	$7.57 \pm 0.46$	$1.69 \pm 0.22$	$0.33 \pm 0.09$
	Inclusve	$292.70 \pm 5.28$	$45.06 \pm 1.94$	$12.17 \pm 0.92$
	1 lepton 1 lepton, from W	$8.17 \pm 1.27$	$1.51 \pm 0.57$	$0.44 \pm 0.22$
$tar{t}$	1 lepton, from t	$8.17 \pm 1.27$	$1.51 \pm 0.57$	$0.44 \pm 0.22$
	≥ 2 leptons	$284.53 \pm 5.13$	$43.54 \pm 1.86$	$11.72 \pm 0.22$
	$Z \rightarrow \nu \nu$		45.04 ± 1.00	
	Inclusve	$3.24 \pm 1.10$	$1.08 \pm 0.54$	$0.19 \pm 0.19$
	1 lepton	$3.24 \pm 1.10$ $3.24 \pm 1.10$	$1.08 \pm 0.54$ $1.08 \pm 0.54$	$0.19 \pm 0.19$
.=	1 lepton, from W			
$t\bar{t}$ , single lepFromT, madgraph pythia8	1 lepton, from t	$3.24 \pm 1.10$	$1.08 \pm 0.54$	$0.19 \pm 0.19$
	> 2 leptons			
	$Z \rightarrow \nu \nu$	_	_	-
	Inclusve	$4.93 \pm 0.63$	$0.43 \pm 0.18$	$0.25 \pm 0.11$
	1 lepton	$4.93 \pm 0.63$	$0.43 \pm 0.18$	$0.25 \pm 0.11$
$t\bar{t}$ , single lepFromTbar, madgraph pythia8, ext1	1 lepton, from W	_	_	-
tt, single lepitomi bar, madgraphi pythiao, exti	1 lepton, from $t$	$4.93 \pm 0.63$	$0.43 \pm 0.18$	$0.25 \pm 0.11$
	$\geq 2$ leptons	_	_	_
	$Z \rightarrow \nu \nu$			
	Inclusve	$284.53 \pm 5.13$	$43.54 \pm 1.86$	$11.72 \pm 0.89$
	1 lepton	_	_	_
$t\bar{t}$ , diLepton, madgraph pythia8, ext1	1 lepton, from W	_	_	_
	1 lepton, from $t$ > 2 leptons	$-$ 284.53 $\pm$ 5.13	$-43.54 \pm 1.86$	$11.72 \pm 0.89$
	$Z \rightarrow \nu \nu$	284.33 ± 3.13	43.54 ± 1.86	11.72 ± 0.89
	Inclusve	4.68 ± 1.76	_	
	1 lepton	1.73 ± 0.95	_	_
	1 lepton, from W		_	_
single t	1 lepton, from t	$1.73 \pm 0.95$	_	_
	> 2 leptons	$2.95 \pm 1.48$	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$4.58 \pm 1.75$	_	_
	1 lepton	$1.63 \pm 0.95$	_	_
single $t \ t - W$ -channel	1 lepton, from W	_	_	-
single t t = W-channel	1 lepton, from t	$1.63 \pm 0.95$	_	_
	≥ 2 leptons	$2.95 \pm 1.48$	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	_	_	_
	1 lepton 1 lepton, from W	_	_	_
single $t$ , $t-W$ -channel, powheg pythia8	1 lepton, from t		_	
	> 2 leptons			
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$4.58 \pm 1.75$	_	_
	1 lepton	1.63 ± 0.95	_	_
1 1 T ( W 1 1 1 1 11 0	1 lepton, from W		_	_
single $\bar{t}, t - W$ -channel, powheg pythia8	1 lepton, from t	$1.63 \pm 0.95$	_	-
	≥ 2 leptons	$2.95 \pm 1.48$	_	-
	$Z \rightarrow \nu \nu$	_	_	-
	Inclusve	$0.10 \pm 0.10$	_	_
	1 lepton	$0.10 \pm 0.10$	_	-
single $t$ non $t - W$ -channel	1 lepton, from W	_	_	-
omate then t - W-channel	1 lepton, from t	$0.10 \pm 0.10$	_	-
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_		L. —
			Continu	ed on next page

Table	3 - continued from	previous page		
Sample	Classification	$\geq$ 4jets MT2W< 200 250 < MET < 350	$\geq$ 4 jets MT2W < 200 350 < MET < 450	≥4jets MT2W < 200 MET > 450
	Inclusve	$0.10 \pm 0.10$		
			_	_
	1 lepton	$0.10 \pm 0.10$	_	_
single t, s-channel, amenlo pythia8	1 lepton, from W		_	_
	1 lepton, from t	$0.10 \pm 0.10$	_	_
	$\geq$ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	<del>-</del>	<del>-</del>	_
	Inclusve	$8.67 \pm 2.14$	$1.65 \pm 0.71$	$0.27 \pm 0.09$
	1 lepton	$8.67 \pm 2.14$	$1.65 \pm 0.71$	$0.27 \pm 0.09$
	1 lepton, from W	$8.67 \pm 2.14$	$1.65 \pm 0.71$	$0.27 \pm 0.09$
V+Jets	1 lepton, from t			
	> 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$			
	Inclusve			
		_	_	
	1 lepton	<del>-</del>	_	_
$DY+Jets \rightarrow \ell\ell$	1 lepton, from W	_	_	_
	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	_		_
	1 lepton	_	_	_
	1 lepton, from W	_	_	_
DY+Jets→ ℓℓ, M10to50, amcnlo pythia8	1 lepton, from t	_		_
	> 2 leptons	_		_
		<del>-</del>	_	_
	$Z \rightarrow \nu \nu$			_
	Inclusve	<del></del>	_	_
	1 lepton	_	_	_
DY+Jets→ ℓℓ, M50, amcnlo pythia8	1 lepton, from W	<del>-</del>	<del>_</del>	_
D1 ∓Jets→ εε, MJO, amenio pytinas	1 lepton, from t	_	_	_
	> 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$8.67 \pm 2.14$	$1.65 \pm 0.71$	$0.27 \pm 0.09$
	1 lepton	$8.67 \pm 2.14$	$1.65 \pm 0.71$	$0.27 \pm 0.09$
	1 lepton, from W	$8.67 \pm 2.14$	$1.65 \pm 0.71$	$0.27 \pm 0.09$
W+Jets $\rightarrow \ell \nu$	1 lepton, from t	8.07 ± 2.14	1.03 ± 0.71	0.27 ± 0.09
		<del>-</del>	_	_
	≥ 2 leptons	<del>-</del>	_	_
	$Z \rightarrow \nu \nu$			
	Inclusve	_	_	_
	1 lepton	_	_	_
W+Jets $\rightarrow \ell \nu$ , 100 < HT < 200, madgraph pythia8	1 lepton, from W	<del>-</del>	<del></del>	_
** + 3005 - cv, 100 < 111 < 200, maugraph pythias	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$2.05 \pm 1.20$	$0.48 \pm 0.48$	
	1 lepton	$2.05 \pm 1.20$	$0.48 \pm 0.48$	_
	1 lepton, from W	$2.05 \pm 1.20$ $2.05 \pm 1.20$	$0.48 \pm 0.48$ $0.48 \pm 0.48$	
W+Jets $\rightarrow \ell \nu$ , 200 < HT < 400, madgraph pythia8	1 lepton, from t	2.03 ± 1.20	U.40 _ U.40	
		_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	<del></del>	<del></del>	
	Inclusve	$3.76 \pm 1.69$	$0.48 \pm 0.48$	_
	1 lepton	$3.76 \pm 1.69$	$0.48 \pm 0.48$	-
W.   I-t-   # 400 < HT < 600 1   11   0	1 lepton, from W	$3.76 \pm 1.69$	$0.48 \pm 0.48$	_
W+Jets $\rightarrow \ell \nu$ , 400 < HT < 600, madgraph pythia8			_	l –
	1 lepton, from t			I
		_	_	_
	≥ 2 leptons	_	_	_
	$\geq 2 \text{ leptons} \ Z  o  u  u$	  0.42 + 0.17	  0.53 + 0.21	0.08 + 0.08
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$ Inclusve	0.42 ± 0.17	0.53 ± 0.21	0.08 ± 0.08
	$\geq 2  ext{ leptons}$ $Z  o  u  u$ Inclusve 1 lepton	$0.42 \pm 0.17$	$0.53 \pm 0.21$	$0.08 \pm 0.08$
W+Jets $\rightarrow \ell \nu$ , 600 < $HT$ < 800, madgraph pythia8	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$ Inclusve 1 lepton 1 lepton, from W			
W+Jets $\rightarrow \ell \nu,  600 < HT < 800,$ madgraph pythia 8		$0.42 \pm 0.17$	$0.53 \pm 0.21$	$0.08 \pm 0.08$
W+Jets $\rightarrow \ell \nu,600 < HT < 800,{ m madgraph}$ pythia 8		$0.42 \pm 0.17$	$0.53 \pm 0.21$	$0.08 \pm 0.08$
W+Jets $\rightarrow \ell \nu,  600 < HT < 800,  { m madgraph  pythia8}$		$0.42 \pm 0.17$	$\begin{array}{c} 0.53  \pm  0.21 \\ 0.53  \pm  0.21 \\ \\ - \\ \\ - \\ \end{array}$	$0.08 \pm 0.08$

Table	3 – continued from			
		≥4jets	≥4jets	≥4jets
Sample	Classification	MT2W< 200	MT2W < 200	MT2W < 200
		250 < MET < 350	350 < MET < 450	MET > 450
	Inclusve	$1.08 \pm 0.17$	$0.15 \pm 0.06$	$0.18 \pm 0.05$
	1 lepton	$1.08 \pm 0.17$	$0.15 \pm 0.06$	$0.18 \pm 0.05$
	1 lepton, from W	$1.08 \pm 0.17$	$0.15 \pm 0.06$	$0.18 \pm 0.05$
W+Jets $\rightarrow \ell \nu$ , 800 $< HT < 1200$ , madgraph pythia8	1 lepton, from t			
	> 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$1.36 \pm 0.49$		_
	1 lepton	$1.36 \pm 0.49$	_	_
	1 lepton, from W	$1.36 \pm 0.49$	_	_
W+Jets $\rightarrow \ell \nu$ , 1200 $< HT < 2500$ , madgraph pythia8	1 lepton, from t	_	_	_
	> 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$0.01 \pm 0.01$	$0.01 \pm 0.00$	$0.01 \pm 0.01$
	1 lepton	$0.01 \pm 0.01$	$0.01 \pm 0.00$	$0.01 \pm 0.01$
*****	1 lepton, from W	$0.01 \pm 0.01$	$0.01 \pm 0.00$	$0.01 \pm 0.01$
W+Jets $\rightarrow \ell \nu$ , 2500 $< HT < Inf$ , madgraph pythia8	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$11.22 \pm 0.93$	$2.18 \pm 0.30$	$0.66 \pm 0.15$
	1 lepton	$1.02 \pm 0.59$	$0.08 \pm 0.05$	$0.05 \pm 0.04$
D	1 lepton, from W	$0.97 \pm 0.59$	$0.06 \pm 0.05$	$0.03 \pm 0.04$
Rare	1 lepton, from t	$0.05 \pm 0.04$	$0.02 \pm 0.01$	$0.02 \pm 0.02$
	≥ 2 leptons	$2.63 \pm 0.55$	$0.40 \pm 0.20$	$0.28 \pm 0.12$
	$Z \rightarrow \nu \nu$	$7.57 \pm 0.46$	$1.69 \pm 0.22$	$0.33 \pm 0.09$
	Inclusve	$2.44 \pm 0.80$	$0.47 \pm 0.23$	$0.05 \pm 0.09$
	1 lepton	$0.92 \pm 0.59$	$0.06 \pm 0.05$	$0.03 \pm 0.04$
diBoson	1 lepton, from W	$0.92 \pm 0.59$	$0.06 \pm 0.05$	$0.03 \pm 0.04$
diboson	1 lepton, from t	_	_	_
	≥ 2 leptons	$0.61 \pm 0.30$	_	_
	$Z \rightarrow \nu \nu$	$0.91 \pm 0.45$	$0.41 \pm 0.22$	$0.02 \pm 0.09$
	Inclusve	$1.08 \pm 0.65$	_	_
	1 lepton	$0.58 \pm 0.58$	_	_
WW	1 lepton, from W	$0.58 \pm 0.58$	_	_
VV VV	1 lepton, from t	_	<del>_</del>	_
	≥ 2 leptons	$0.50 \pm 0.29$	<del>_</del>	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$0.50 \pm 0.29$	_	_
	1 lepton	_	_	_
$WW \rightarrow 2\ell 2\nu$ , powheg	1 lepton, from W	_	_	_
,, ,, , zezz, powneg	1 lepton, from t	_	_	_
	≥ 2 leptons	$0.50 \pm 0.29$	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$0.58 \pm 0.58$	_	
	1 lepton	$0.58 \pm 0.58$	_	_
$WW \rightarrow \ell \nu qq$ , powheg	1 lepton, from W	$0.58 \pm 0.58$	_	_
11, Роппов	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$1.33 \pm 0.47$	$0.45 \pm 0.23$	$0.04 \pm 0.09$
	1 lepton	$0.34 \pm 0.11$	$0.06 \pm 0.05$	$0.03 \pm 0.04$
WZ	1 lepton, from W	$0.34 \pm 0.11$	$0.06 \pm 0.05$	$0.03 \pm 0.04$
·· =	1 lepton, from t	_	_	_
	≥ 2 leptons	$0.11 \pm 0.08$	<del>-</del>	_
	$Z \rightarrow \nu \nu$	$0.88 \pm 0.45$	$0.39 \pm 0.22$	$0.01 \pm 0.09$
	Inclusve	$0.11 \pm 0.08$		_
	1 lepton	_	_	_
$WZ \rightarrow 3\ell\nu$ , powheg pythia8	1 lepton, from W	_	_	_
=, Formes Pjenne	1 lepton, from t		_	_
		$0.11 \pm 0.08$		
	≥ 2 leptons	0.11 ± 0.08		
	$Z \rightarrow \nu \nu$	- 0.11 ± 0.08	_	ed on next page

Table 3 – continued from previous page							
		≥4jets	≥4jets	≥4jets			
Sample	Classification	MT2W < 200	MT2W< 200	MT2W< 200			
		250 < MET < 350	350 < MET < 450	MET > 450			
	Inclusve	$0.00 \pm 0.01$	_	_			
	1 lepton	_	_	_			
$WZ\rightarrow 2\ell 2Q$ , amenlo pythia8	1 lepton, from W	_	_	_			
W Z - ZeZeg, amenio pytinao	1 lepton, from t	_	_	_			
	≥ 2 leptons	$0.00 \pm 0.01$	_	_			
	$Z \rightarrow \nu \nu$	_	_				
	Inclusve	$0.34 \pm 0.11$	$0.06 \pm 0.05$	$0.03 \pm 0.04$			
	1 lepton	$0.34 \pm 0.11$	$0.06 \pm 0.05$	$0.03 \pm 0.04$			
$WZ \rightarrow \ell \nu 2Q$ , amenlo pythia8	1 lepton, from W	$0.34 \pm 0.11$	$0.06 \pm 0.05$	$0.03 \pm 0.04$			
• • • • • • • • • • • • • • • • • • • •	1 lepton, from t	_	_	_			
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	_	_	_			
				0.01   0.00			
	Inclusve 1 lepton	$0.88 \pm 0.45$	$0.39 \pm 0.22$	$0.01 \pm 0.09$			
	1 lepton, from W	_	_	_			
$WZ \rightarrow 1\ell 3\nu$ , amcnlo pythia8	1 lepton, from t						
	> 2 leptons						
	$Z \rightarrow \nu \nu$	$0.88 \pm 0.45$	$0.39 \pm 0.22$	$0.01 \pm 0.09$			
	Inclusve	0.03 ± 0.02	$0.03 \pm 0.22$ $0.02 \pm 0.01$	$0.00 \pm 0.00$			
	1 lepton			_ 0.00			
	1 lepton, from W	_	_	_			
ZZ	1 lepton, from t	_	_	_			
	> 2 leptons	$0.00 \pm 0.01$	_	_			
	$Z \rightarrow \nu \nu$	$0.03 \pm 0.02$	$0.02 \pm 0.01$	$0.00 \pm 0.00$			
	Inclusve	$0.00 \pm 0.01$	_				
	1 lepton	_	_	_			
77 0/00 1 /1:0	1 lepton, from W	_	_	_			
$ZZ\rightarrow 2\ell 2Q$ , amcnlo pythia8	1 lepton, from t	_	_	_			
	≥ 2 leptons	$0.00 \pm 0.01$	_	_			
	$Z \rightarrow \nu \nu$	_	_	_			
	Inclusve	$0.03 \pm 0.01$	$0.01 \pm 0.00$	$0.00 \pm 0.00$			
	1 lepton	_	<u> </u>	_			
$ZZ\rightarrow 2\ell 2\nu$ , powheg pythia8	1 lepton, from W	_	_	_			
22 - 2020, powince pythiae	1 lepton, from $t$	_	_	_			
	≥ 2 leptons	_	<del>-</del>	_			
	$Z \rightarrow \nu \nu$	$0.03 \pm 0.01$	$0.01 \pm 0.00$	$0.00 \pm 0.00$			
	Inclusve	_	$0.00 \pm 0.00$	_			
	1 lepton	_	<del>-</del>	_			
$ZZ\rightarrow 2Q2\nu$ , amcnlo pythia8	1 lepton, from W	_	_	_			
* /	1 lepton, from t	_	_	_			
	≥ 2 leptons	_		_			
	$Z \rightarrow \nu \nu$	9 79 ± 0 47	$0.00 \pm 0.00$	0.61 ± 0.19			
	Inclusve	$8.78 \pm 0.47$ $0.09 \pm 0.05$	$1.71 \pm 0.20$	$0.61 \pm 0.12$			
	1 lepton 1 lepton, from W	$0.09 \pm 0.05$ $0.05 \pm 0.03$	$0.02 \pm 0.01$	$0.02 \pm 0.02$			
$t\bar{t} + V$	1 lepton, from W	$0.05 \pm 0.03$ $0.05 \pm 0.04$	$0.02 \pm 0.01$	$0.02 \pm 0.02$			
	> 2 leptons	$0.05 \pm 0.04$ $2.02 \pm 0.46$	$0.02 \pm 0.01$ $0.40 \pm 0.20$	$0.02 \pm 0.02$ $0.28 \pm 0.12$			
	$Z \rightarrow \nu \nu$	$6.66 \pm 0.07$	$1.29 \pm 0.03$	$0.28 \pm 0.12$ $0.32 \pm 0.01$			
	Inclusve	1.99 ± 0.47	$0.40 \pm 0.20$	$0.32 \pm 0.01$ $0.29 \pm 0.12$			
	1 lepton	$0.06 \pm 0.05$	$0.40 \pm 0.20$ $0.01 \pm 0.01$	$0.29 \pm 0.12$ $0.02 \pm 0.02$			
	1 lepton, from W	$0.05 \pm 0.03$ $0.05 \pm 0.03$	0.01 ± 0.01	- 0.02			
$tar{t}+W$	1 lepton, from t	$0.00 \pm 0.03$ $0.01 \pm 0.04$	$0.01 \pm 0.01$	$0.02 \pm 0.02$			
	> 2 leptons	$1.93 \pm 0.46$	$0.39 \pm 0.20$	$0.02 \pm 0.02$ $0.27 \pm 0.12$			
	$Z \rightarrow \nu \nu$						
		$1.32 \pm 0.43$	$0.23 \pm 0.18$	$0.19 \pm 0.11$			
	Inclusve						
	Inclusve 1 lepton						
.T	1 lepton	$0.05 \pm 0.03$					
$t \bar t + W \!  o \! \ell  u,$ amc nlo pythia 8			_				
$t\bar{t} + W \! \rightarrow \! \ell \nu,$ amenlo pythia 8	1 lepton 1 lepton, from W	$\begin{array}{c} 0.05 \pm 0.03 \\ 0.05 \pm 0.03 \end{array}$	_	0.19 ± 0.11			
$t \bar t + W \!  o \! \ell \nu,$ amc nlo pythia 8	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \end{array}$	$0.05 \pm 0.03$ $0.05 \pm 0.03$ —	_ _ _	_ _ _			

Table 3 - continued from previous page

Table 3 – continued from previous page						
Sample	Classification	≥4jets MT2W< 200 250 < MET < 350	$\geq$ 4 jets MT2W < 200 350 < MET < 450	≥4jets MT2W< 200 MET > 450		
$t \bar{t} + W \!  ightarrow \! Q Q$ , amenlo pythia 8	$ \begin{array}{c} \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \text{Inclusve} \\ 1 \text{ lepton} \end{array} $	$\begin{array}{c} 0.66 \pm 0.19 \\ 0.01 \pm 0.04 \\ \hline$	$\begin{array}{c} 0.16 \pm 0.09 \\ 0.01 \pm 0.01 \\ \hline$	$\begin{array}{c} 0.10 \pm 0.05 \\ 0.02 \pm 0.02 \\ \hline \\ 0.02 \pm 0.02 \\ \hline \\ 0.02 \pm 0.02 \\ 0.09 \pm 0.05 \\ \hline \\ 0.33 \pm 0.01 \\ \hline \end{array}$		
$tar{t}+Z$	1 lepton, from W 1 lepton, from t $\geq 2 \text{ leptons}$ $Z \rightarrow \nu\nu$	$\begin{array}{c}$	$\begin{array}{c}$	$0.01 \pm 0.00$ $0.32 \pm 0.01$		
$tar{t}+Z,$ madgraph	Inclusve 1 lepton 1 lepton, from $W$ 1 lepton, from $t$ $\geq$ 2 leptons $Z \rightarrow \nu \nu$	$\begin{array}{c} 6.79 \pm 0.07 \\ 0.03 \pm 0.00 \\$	$\begin{array}{c} 1.31 \pm 0.03 \\ 0.01 \pm 0.00 \\$	$\begin{array}{c} 0.33 \pm 0.01 \\$		
$tar{t} + Z { ightarrow} QQ$ , amenlo pythia8	Inclusve 1 lepton 1 lepton, from W 1 lepton, from t $\geq$ 2 leptons $Z \rightarrow \nu \nu$	$\begin{array}{c} 0.67 \pm 0.32 \\ 0.05 \pm 0.06 \\$	0.33 ± 0.13 — — 0.33 ± 0.13 —	0.06 ± 0.07 — — — — 0.06 ± 0.06		
$tar{t} + Z \!  ightarrow \! 2\ell 2  u, amenlo pythia 8$	Inclusve 1 lepton 1 lepton, from $W$ 1 lepton, from $t$ $\geq$ 2 leptons $Z \rightarrow \nu \nu$	$7.08 \pm 0.71$	1.66 ± 0.34 ————————————————————————————————————	$\begin{array}{c} 0.75 \pm 0.18 \\$		

SR, Nominal Systematic, Yield Table for Input Samples

	SR, Nomin	al Systematic, Yield Ta				
		≥4jets	≥4jets	≥4jets	≥4jets	≥4jets
Sample	Classification	MT2W≥ 200	MT2W≥ 200	MT2W≥ 200	$MT2W \ge 200$	$MT2W \ge 200$
		250 < MET < 350	350 < MET < 450	450 < MET < 550	550 < MET < 650	MET > 650
Data, single $e/\mu$ , MET	Inclusve	61.00 ± 7.81	$22.00 \pm 4.69$	$6.00 \pm 2.45$	$1.00 \pm 1.00$	$6.00 \pm 2.45$
	Inclusve	86.78 ± 4.26	29.08 ± 2.17	9.71 ± 1.53	$2.87 \pm 0.78$	$2.43 \pm 0.54$
	1 lepton	20.70 ± 2.92	8.27 ± 1.52	3.30 ± 1.01	$0.77 \pm 0.29$	$1.34 \pm 0.37$
	1 lepton, from W	16.30 + 2.80	6.40 + 1.39	3.25 + 1.01	$0.77 \pm 0.29$	$1.17 \pm 0.36$
All Background	1 lepton, from t	4.39 ± 0.85	1.86 ± 0.62	0.05 ± 0.05	0.11 ± 0.23	$0.17 \pm 0.09$
	> 2 leptons	59.27 ± 3.07	16.36 ± 1.45	4.95 ± 1.08	$1.51 \pm 0.69$	$0.88 \pm 0.34$
	$Z \rightarrow \nu \nu$	6.81 ± 0.46	4.45 ± 0.55	1.46 ± 0.39	$0.59 \pm 0.23$	$0.21 \pm 0.19$
	Inclusve	55.98 ± 2.47	16.94 ± 1.46	$3.82 \pm 0.65$	$0.78 \pm 0.27$	$0.63 \pm 0.22$
	1 lepton	4.33 ± 0.84	1.86 ± 0.62	0.05 ± 0.05	0.10 ± 0.21	$0.17 \pm 0.09$
	1 lepton, from W	1.00 ± 0.01	1.00 ± 0.02	0.00 ± 0.00	_	
$tar{t}$	1 lepton, from t	$4.33 \pm 0.84$	$1.86 \pm 0.62$	$0.05 \pm 0.05$	_	$0.17 \pm 0.09$
	> 2 leptons	$51.65 \pm 2.33$	15.08 ± 1.32	$3.77 \pm 0.64$	$0.78 \pm 0.27$	$0.46 \pm 0.20$
	$Z \rightarrow \nu \nu$					
	Inclusve	$1.62 \pm 0.68$	$1.01 \pm 0.52$	_	_	
	1 lepton	1.62 ± 0.68	1.01 ± 0.52	_		_
	1 lepton, from W	1.02 ± 0.00	1.01 ± 0.02			_
$t\bar{t}$ , single lepFromT, madgraph pythia8	1 lepton, from t	$1.62 \pm 0.68$	$1.01 \pm 0.52$			_
	> 2 leptons	1.02 ± 0.00	1.01 ± 0.02			_
	$Z \rightarrow \nu \nu$					_
	Inclusve	$2.71 \pm 0.49$	$0.85 \pm 0.35$	$0.05 \pm 0.05$		$0.17 \pm 0.09$
	1 lepton	$2.71 \pm 0.49$ $2.71 \pm 0.49$	$0.85 \pm 0.35$ $0.85 \pm 0.35$	$0.05 \pm 0.05$		$0.17 \pm 0.09$ $0.17 \pm 0.09$
	1 lepton, from W	2.71 ± 0.49	0.85 ± 0.35	0.03 ± 0.03		0.17 ± 0.09
$t\bar{t}$ , single lepFromTbar, madgraph pythia8, ext1	1 lepton, from t	$2.71 \pm 0.49$	$0.85 \pm 0.35$	$0.05 \pm 0.05$		$0.17 \pm 0.09$
	> 2 leptons	2.71 ± 0.49	0.85 ± 0.35	0.03 ± 0.03		0.17 ± 0.09
	$Z \rightarrow \nu \nu$	_	_	_		_
	Inclusve	$51.65 \pm 2.33$	$15.08 \pm 1.32$	$3.77 \pm 0.64$	$0.78 \pm 0.27$	$0.46 \pm 0.20$
	1 lepton	01.00 ± 2.00	10.00 ± 1.02	3.77 ± 0.04	0.70 ± 0.27	0.40 ± 0.20
	1 lepton, from W					
$t\bar{t}$ , diLepton, madgraph pythia8, ext1	1 lepton, from t					_
diLepton, madgraph pythia8, ext1	> 2 leptons	51.65 ± 2.33	15.08 ± 1.32	$3.77 \pm 0.64$	$0.78 \pm 0.27$	$0.46 \pm 0.20$
	$Z \rightarrow \nu \nu$	01.00 ± 2.00	10.00 ± 1.02	3.77 ± 0.04	0.70 ± 0.27	0.40 ± 0.20
	Inclusve	$5.84 \pm 2.12$	$1.23 \pm 0.87$	$0.85 \pm 0.85$	$0.63 \pm 0.63$	$0.28 \pm 0.28$
	1 lepton	0.86 + 0.86	0.70 + 0.70	0.55 ± 0.55	0.05 ± 0.05	0.20 ± 0.20
	1 lepton, from W	0.86 ± 0.86	0.70 ± 0.70	_		_
single t	1 lepton, from t	0.50 ± 0.50	0.70 ± 0.70	_		_
	≥ 2 leptons	4.98 ± 1.94	$0.53 \pm 0.53$	$0.85 \pm 0.85$	$0.63 \pm 0.63$	$0.28 \pm 0.28$
	$Z \rightarrow \nu \nu$	1.00 ± 1.01	0.00 ± 0.00	0.00 ± 0.00		
	Inclusve	$5.84 \pm 2.12$	1.23 ± 0.87	$0.85 \pm 0.85$	$0.63 \pm 0.63$	$0.28 \pm 0.28$
	1 lepton	0.86 ± 0.86	0.70 ± 0.70	0.00 ± 0.00		
	1 lepton, from W	0.86 ± 0.86	0.70 ± 0.70	_	_	_
single $t$ $t$ – $W$ -channel	1 lepton, from t	I - 0.00 ± 0.00	0.70 ± 0.70	_	_	_
	> 2 leptons	4.98 ± 1.94	$0.53 \pm 0.53$	$0.85 \pm 0.85$	$0.63 \pm 0.63$	$0.28 \pm 0.28$
	$Z \rightarrow \nu \nu$	1.00 ± 1.01	0.00 ± 0.00	0.00 ± 0.00	- 0.00 ± 0.00	— — — — — — — — — — — — — — — — — — —
	Inclusve				_	_
	1 lepton	_	_	_	_	_
	1 lepton, from W	_	_	_		_
single $t$ , $t - W$ -channel, powheg pythia8	1 lepton, from t	_	_	_		_
	> 2 leptons	_	_	_		_
	$Z \rightarrow \nu \nu$	_	_	_		_
	Inclusve	$5.84 \pm 2.12$	1.23 ± 0.87	$0.85 \pm 0.85$	$0.63 \pm 0.63$	$0.28 \pm 0.28$
	1 lepton	0.86 ± 0.86	0.70 ± 0.70	0.50 ± 0.50		
	1 lepton, from W	0.86 ± 0.86	0.70 ± 0.70	_	_	
single $\bar{t}$ , $t-W$ -channel, powheg pythia8	1 lepton, from t	I - 0.00 ± 0.00	I	_	_	_
	> 2 leptons	4.98 ± 1.94	$0.53 \pm 0.53$	$0.85 \pm 0.85$	$0.63 \pm 0.63$	$0.28 \pm 0.28$
	$Z \rightarrow \nu \nu$	I	I	1		
	Inclusve	_	_	_	_	
	1 lepton	_	_	_		_
	1 lepton, from W		_			_
single $t$ non $t - W$ -channel	1 lepton, from t			_		
	≥ 2 leptons		_			_
	≥ 2 reprons	l .	1	ı	l .	
	$Z \rightarrow \nu \nu$	<u> </u>	_			

Table $4$ – continued from previous page								
		≥4jets	≥4jets	≥4jets				
Sample	Classification	MT2W≥ 200	$MT2W \ge 200$	$MT2W \ge 200$	$MT2W \ge 200$	$MT2W \ge 200$		
		250 < MET < 350	350 < MET < 450	450 < MET < 550	550 < MET < 650	MET > 650		
	Inclusve							
	1 lepton	_	_		_			
	1 lepton 1 lepton, from W	_	_	_	_	_		
single t, s-channel, amcnlo pythia8		_	_	_	_	_		
, , , , , , , , , , , , , , , , , , , ,	1 lepton, from t	_	_	<del>-</del>	<del>-</del>	_		
	≥ 2 leptons	_	_	<del>-</del>	<del>-</del>	_		
	$Z \rightarrow \nu \nu$		<u> </u>	<del>-</del>		_		
	Inclusve	$14.43 \pm 2.62$	$5.42 \pm 1.19$	$3.12 \pm 1.01$	$0.74 \pm 0.28$	$1.17 \pm 0.36$		
	1 lepton	$14.43 \pm 2.62$	$5.42 \pm 1.19$	$3.12 \pm 1.01$	$0.74 \pm 0.28$	$1.17 \pm 0.36$		
$V + \mathrm{Jets}$	1 lepton, from W	$14.43 \pm 2.62$	$5.42 \pm 1.19$	$3.12 \pm 1.01$	$0.74 \pm 0.28$	$1.17 \pm 0.36$		
V T Sets	1 lepton, from $t$	_	_	<del>-</del>	<del>-</del>	_		
	≥ 2 leptons	_	_	<del>-</del>	<del>-</del>	_		
	$Z \rightarrow \nu \nu$	_	_	<u> </u>	<del>_</del>	_		
	Inclusve	_	_	_	_	_		
	1 lepton	_	_	<u> </u>	_	_		
	1 lepton, from W	_	<u> </u>	<u>—</u>	_	_		
$DY+Jets \rightarrow \ell\ell$	1 lepton, from t	_	_	<u>—</u>	_	_		
	> 2 leptons	_	_	<u>—</u>	_	_		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
	Inclusve	_				_		
	1 lepton	_						
	1 lepton, from W	_	_					
DY+Jets→ ℓℓ, M10to50, amenlo pythia8	1 lepton, from t	_		<del>_</del>		_		
		_	_	<del>-</del>	<del>-</del>			
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	_	_					
			<del>_</del>					
	Inclusve	_	_	_	_	_		
	1 lepton	_	_					
DY+Jets→ ℓℓ, M50, amcnlo pythia8	1 lepton, from W	_	_	<del>-</del>	<del>-</del>	_		
* **	1 lepton, from t	_	_	<del>-</del>	<del>-</del>	_		
	≥ 2 leptons	_	_	<del>-</del>	<del>_</del>	_		
	$Z \rightarrow \nu \nu$		<u> </u>	<del>-</del>		_		
	Inclusve	$14.43 \pm 2.62$	$5.42 \pm 1.19$	$3.12 \pm 1.01$	$0.74 \pm 0.28$	$1.17 \pm 0.36$		
	1 lepton	$14.43 \pm 2.62$	$5.42 \pm 1.19$	$3.12 \pm 1.01$	$0.74 \pm 0.28$	$1.17 \pm 0.36$		
W+Jets $\rightarrow \ell \nu$	1 lepton, from W	$14.43 \pm 2.62$	$5.42 \pm 1.19$	$3.12 \pm 1.01$	$0.74 \pm 0.28$	$1.17 \pm 0.36$		
**   0000 - 00	1 lepton, from $t$	_	_	_	_	_		
	≥ 2 leptons	_	_	<del>-</del>	<del>-</del>	_		
	$Z \rightarrow \nu \nu$	_	_	_	<del>-</del>	_		
	Inclusve	$1.46 \pm 1.46$	_	_		_		
	1 lepton	$1.46 \pm 1.46$	_	_	_	_		
W+Jets $\rightarrow \ell \nu$ , 100 < HT < 200, madgraph pythia8	1 lepton, from W	$1.46 \pm 1.46$	_	_	_	_		
w ⊤Jets→ εν, 100 < n1 < 200, madgraph pythia8	1 lepton, from t	_	_	_	_	_		
	≥ 2 leptons	_	_	_	_	_		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
	Inclusve	$3.12 \pm 1.42$	_	$0.61 \pm 0.61$		_		
	1 lepton	$3.12 \pm 1.42$	_	$0.61 \pm 0.61$	_	_		
W. I	1 lepton, from W	$3.12 \pm 1.42$	_	$0.61 \pm 0.61$	_	_		
W+Jets $\rightarrow \ell \nu$ , 200 $< HT < 400$ , madgraph pythia8	1 lepton, from t	_	_	_	_	_		
	> 2 leptons	_	_	<u> </u>	_	_		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
	Inclusve	$3.11 \pm 1.41$	$1.38 \pm 0.80$	$0.66 \pm 0.66$		_		
	1 lepton	3.11 ± 1.41	1.38 ± 0.80	$0.66 \pm 0.66$	_	_		
	1 lepton, from W	3.11 ± 1.41	1.38 ± 0.80	$0.66 \pm 0.66$	_	_		
W+Jets $\rightarrow \ell \nu$ , 400 < $HT$ < 600, madgraph pythia8	1 lepton, from t	0.11 ± 1.41	1 -100 ± 0.00	- 0.00 ± 0.00	_	_		
	> 2 leptons	_	_	_	_	_		
	$Z \rightarrow \nu \nu$		_	_	_	_		
	Inclusve	2.27 ± 0.51	1.70 ± 0.50	0.76 ± 0.32	0.06 ± 0.06	$0.28 \pm 0.14$		
	1 lepton	$2.27 \pm 0.51$ $2.27 \pm 0.51$	1.70 ± 0.50 1.70 ± 0.50	$0.76 \pm 0.32$ $0.76 \pm 0.32$	$0.06 \pm 0.06$ $0.06 \pm 0.06$	$0.28 \pm 0.14$ $0.28 \pm 0.14$		
	1 lepton 1 lepton, from W	$2.27 \pm 0.51$ $2.27 \pm 0.51$	1.70 ± 0.50 1.70 ± 0.50	$0.76 \pm 0.32$ $0.76 \pm 0.32$	$0.06 \pm 0.06$ $0.06 \pm 0.06$	$0.28 \pm 0.14$ $0.28 \pm 0.14$		
W+Jets $\rightarrow \ell \nu$ , 600 $< HT < 800$ , madgraph pythia8	1 lepton, from t	2.27 ± 0.31	1.70 ± 0.30	0.70 ± 0.32	0.00 ± 0.00	0.20 ± 0.14		
	$\geq 2$ leptons	_	_	_	_			
	$Z \rightarrow \nu \nu$		_	_	_			
	$Z \rightarrow \nu \nu$							
1					Continu	ed on next page		

	Tabi	e 4 – continued from	previous page			
		≥4jets	≥4jets	≥4jets	≥4jets	≥4jets
Sample	Classification	$MT2W \ge 200$				
		250 < MET < 350	350 < MET < 450	450 < MET < 550	550 < MET < 650	MET > 650
	Inclusve	2.88 ± 0.31	$1.09 \pm 0.18$	$0.49 \pm 0.13$	$0.20 \pm 0.09$	$0.41 \pm 0.09$
		2.88 ± 0.31	1.09 ± 0.18 1.09 ± 0.18		0.20 ± 0.09 0.20 ± 0.09	$0.41 \pm 0.09$ $0.41 \pm 0.09$
	1 lepton			$0.49 \pm 0.13$		
W+Jets $\rightarrow \ell \nu$ , 800 $< HT < 1200$ , madgraph pythia8	1 lepton, from W	$2.88 \pm 0.31$	$1.09 \pm 0.18$	$0.49 \pm 0.13$	$0.20 \pm 0.09$	$0.41 \pm 0.09$
. , , ,	1 lepton, from $t$	_	_	_	_	_
	≥ 2 leptons	_	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_	_
	Inclusve	$1.41 \pm 0.58$	$1.17 \pm 0.71$	$0.54 \pm 0.30$	$0.46 \pm 0.26$	$0.46 \pm 0.32$
	1 lepton	$1.41 \pm 0.58$	$1.17 \pm 0.71$	$0.54 \pm 0.30$	$0.46 \pm 0.26$	$0.46 \pm 0.32$
TTT   T   4 4000   TTT   0000   1   1   11   0	1 lepton, from W	$1.41 \pm 0.58$	$1.17 \pm 0.71$	$0.54 \pm 0.30$	$0.46 \pm 0.26$	$0.46 \pm 0.32$
W+Jets $\rightarrow \ell \nu$ , 1200 $< HT < 2500$ , madgraph pythia8	1 lepton, from t	l —	_	<u> </u>	_	_
	> 2 leptons	_	_	_	_	_
	$Z \rightarrow \nu \nu$					_
	Inclusve	$0.19 \pm 0.03$	$0.07 \pm 0.02$	$0.06 \pm 0.02$	$0.02 \pm 0.01$	$0.02 \pm 0.01$
		$0.19 \pm 0.03$ 0.19 + 0.03	$0.07 \pm 0.02$ 0.07 + 0.02	$0.06 \pm 0.02$ $0.06 \pm 0.02$	$0.02 \pm 0.01$ 0.02 + 0.01	$0.02 \pm 0.01$ 0.02 + 0.01
	1 lepton					
W+Jets $\rightarrow \ell \nu$ , 2500 < HT < Inf, madgraph pythia8	1 lepton, from W	$0.19 \pm 0.03$	$0.07 \pm 0.02$	$0.06 \pm 0.02$	$0.02 \pm 0.01$	$0.02 \pm 0.01$
, , , , , , , , , , , , , , , , , , ,	1 lepton, from t	_	_	_	_	_
	≥ 2 leptons	_	_	_	_	_
	$Z \rightarrow \nu \nu$					
	Inclusve	$10.54 \pm 0.83$	$5.50 \pm 0.62$	$1.92 \pm 0.43$	$0.71 \pm 0.24$	$0.35 \pm 0.20$
	1 lepton	$1.08 \pm 0.50$	$0.29 \pm 0.11$	$0.13 \pm 0.08$	$0.03 \pm 0.04$	$0.00 \pm 0.02$
B	1 lepton, from W	$1.02 \pm 0.50$	$0.29 \pm 0.11$	$0.13 \pm 0.08$	$0.03 \pm 0.04$	_
Rare	1 lepton, from t	$0.06 \pm 0.03$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	_	$0.00 \pm 0.00$
	> 2 leptons	$2.65 \pm 0.48$	$0.75 \pm 0.26$	$0.33 \pm 0.16$	$0.09 \pm 0.07$	$0.14 \pm 0.06$
	$Z \rightarrow \nu \nu$	6.81 ± 0.46	4.45 ± 0.55	1.46 ± 0.39	$0.59 \pm 0.23$	$0.21 \pm 0.19$
	Inclusve	$2.26 \pm 0.73$	$2.20 \pm 0.57$	$0.76 \pm 0.42$	0.29 ± 0.23	$0.08 \pm 0.19$
	1 lepton	$0.87 \pm 0.49$	0.29 ± 0.10	0.10 ± 0.42 0.13 ± 0.06	$0.29 \pm 0.23$ $0.01 \pm 0.04$	0.08 ± 0.19
	1 lepton, from W	$0.87 \pm 0.49$ $0.87 \pm 0.49$	$0.29 \pm 0.10$ $0.29 \pm 0.10$	0.13 ± 0.06	$0.01 \pm 0.04$ $0.01 \pm 0.04$	
diBoson			0.29 ± 0.10		0.01 ± 0.04	_
	1 lepton, from t				_	
	≥ 2 leptons	$0.61 \pm 0.28$	$0.11 \pm 0.10$	$0.13 \pm 0.13$		$0.01 \pm 0.01$
	$Z \rightarrow \nu \nu$	$0.77 \pm 0.46$	$1.81 \pm 0.55$	$0.50 \pm 0.39$	$0.28 \pm 0.22$	$0.07 \pm 0.19$
	Inclusve	$0.94 \pm 0.55$	$0.10 \pm 0.10$	$0.13 \pm 0.13$	_	_
	1 lepton	$0.48 \pm 0.48$	_	_	_	_
WW	1 lepton, from W	$0.48 \pm 0.48$	_	_	_	_
VV VV	1 lepton, from $t$	_	_	_	_	_
	> 2 leptons	$0.46 \pm 0.27$	$0.10 \pm 0.10$	$0.13 \pm 0.13$	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_	_
	Inclusve	$0.46 \pm 0.27$	$0.10 \pm 0.10$	$0.13 \pm 0.13$	_	_
	1 lepton	_	_	_	_	_
	1 lepton, from W	_	_	_	_	_
$WW \rightarrow 2\ell 2\nu$ , powheg	1 lepton, from t	_	_	_	_	_
	> 2 leptons	$0.46 \pm 0.27$	$0.10 \pm 0.10$	$0.13 \pm 0.13$	_	_
	$Z \rightarrow \nu \nu$	0.40 ± 0.27	1 0.10 ± 0.10	1	_	_
	Inclusve	$0.48 \pm 0.48$	_			
	1 lepton	$0.48 \pm 0.48$ $0.48 \pm 0.48$	_	_	_	1 –
			_	_	_	
$WW \rightarrow \ell \nu qq$ , powheg	1 lepton, from W	$0.48 \pm 0.48$	_	_	_	_
	1 lepton, from t	_	_	_	_	_
	≥ 2 leptons	_	_	_	_	-
	$Z \rightarrow \nu \nu$	_		_	_	_
	Inclusve	$1.26 \pm 0.48$	$2.08 \pm 0.56$	$0.61 \pm 0.39$	$0.29 \pm 0.23$	$0.07 \pm 0.19$
	1 lepton	$0.40 \pm 0.13$	$0.29 \pm 0.10$	$0.13 \pm 0.06$	$0.01 \pm 0.04$	-
WZ	1 lepton, from W	$0.40 \pm 0.13$	$0.29 \pm 0.10$	$0.13 \pm 0.06$	$0.01 \pm 0.04$	_
VV Z	1 lepton, from t	_	_	_	_	_
	> 2 leptons	$0.12 \pm 0.09$	$0.01 \pm 0.01$	_	_	_
	$Z \rightarrow \nu \nu$	$0.73 \pm 0.46$	$1.78 \pm 0.55$	$0.48 \pm 0.39$	$0.28 \pm 0.22$	$0.07 \pm 0.19$
	Inclusve	0.11 ± 0.08				
	1 lepton	1	_	_	_	_
	1 lepton, from W	_	_	_	_	_
$WZ \rightarrow 3\ell\nu$ , powheg pythia8	1 lepton, from t	_	_	_	_	_
	≥ 2 leptons	0.11 ± 0.08	_	_	_	
	$Z \rightarrow \nu \nu$	J ± 0.00	_		_	
	$Z \rightarrow \nu \nu$	_	_	_		
					Continu	ed on next page

	Tabl	e 4 - continued from	previous page			
		≥4jets	≥4jets	≥4jets	≥4jets	≥4jets
Sample	Classification	$MT2W \ge 200$	$MT2W \ge 200$	$MT2W \ge 200$	$MT2W \ge 200$	$MT2W \ge 200$
		250 < MET < 350	350 < MET < 450	450 < MET < 550	550 < MET < 650	MET > 650
	Inclusve	0.01 ± 0.01	$0.01 \pm 0.01$			
	1 lepton	0.01 ± 0.01	0.01 ± 0.01			
	1 lepton from W	_	_	_	_	_
$WZ\rightarrow 2\ell 2Q$ , amenlo pythia8	1 lepton, from t	_	_	_	_	_
	> 2 leptons	0.01 ± 0.01	$0.01 \pm 0.01$	_	_	
	$Z \rightarrow \nu \nu$	0.01 ± 0.01	0.01 ± 0.01	_	_	_
		_	_	_	_	
	Inclusve	$0.40 \pm 0.13$	$0.29 \pm 0.10$	$0.13 \pm 0.06$	$0.01 \pm 0.04$	_
	1 lepton	$0.40 \pm 0.13$	$0.29 \pm 0.10$	$0.13 \pm 0.06$	$0.01 \pm 0.04$	_
$WZ \rightarrow \ell \nu 2Q$ , amenlo pythia8	1 lepton, from W	$0.40 \pm 0.13$	$0.29 \pm 0.10$	$0.13 \pm 0.06$	$0.01 \pm 0.04$	_
	1 lepton, from t	_	_	_	_	_
	≥ 2 leptons	_	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_	_
	Inclusve	$0.73 \pm 0.46$	$1.78 \pm 0.55$	$0.48 \pm 0.39$	$0.28 \pm 0.22$	$0.07 \pm 0.19$
	1 lepton	_	_	_	_	_
$WZ \rightarrow 1\ell 3\nu$ , amenlo pythia8	1 lepton, from W	_	_	_	_	_
w Z→1€3b, amenio pytinas	1 lepton, from t	_	_	_	_	_
	≥ 2 leptons	_	_	_	_	_
	$Z \rightarrow \nu \nu$	$0.73 \pm 0.46$	$1.78 \pm 0.55$	$0.48 \pm 0.39$	$0.28 \pm 0.22$	$0.07 \pm 0.19$
	Inclusve	$0.07 \pm 0.02$	$0.03 \pm 0.01$	$0.02 \pm 0.01$	$0.01 \pm 0.00$	$0.01 \pm 0.01$
	1 lepton	_	_	_	_	_
	1 lepton, from W	_	_	_	_	_
ZZ	1 lepton, from t	_	_	_	_	_
	> 2 leptons	$0.03 \pm 0.02$	$0.01 \pm 0.01$	_	_	$0.01 \pm 0.01$
	$Z \rightarrow \nu \nu$	$0.04 \pm 0.01$	$0.02 \pm 0.01$	$0.02 \pm 0.01$	$0.01 \pm 0.00$	$0.01 \pm 0.00$
	Inclusve	$0.03 \pm 0.02$	$0.01 \pm 0.01$			$0.01 \pm 0.01$
	1 lepton					
	1 lepton, from W	_	_	_		_
$ZZ\rightarrow 2\ell 2Q$ , amcnlo pythia8	1 lepton, from t					
	> 2 leptons	$0.03 \pm 0.02$	$0.01 \pm 0.01$			$0.01 \pm 0.01$
	$Z \rightarrow \nu \nu$	0.05 ± 0.02	0.01 ± 0.01			0.01 ± 0.01
	Inclusve	$0.04 \pm 0.01$	$0.02 \pm 0.01$	$0.02 \pm 0.00$	0.01 ± 0.00	$0.00 \pm 0.00$
	1 lepton	0.04 ± 0.01	0.02 ± 0.01	0.02 ± 0.00	0.01 ± 0.00	0.00 ± 0.00
	1 lepton W	_	_	_	<del></del>	
$ZZ\rightarrow 2\ell 2\nu$ , powheg pythia8	1 lepton, from t					
	> 2 leptons	_		_	_	_
	$Z \to \nu\nu$	$0.04 \pm 0.01$	$0.02 \pm 0.01$	$0.02 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$
		0.04 ± 0.01	$0.02 \pm 0.01$ $0.00 \pm 0.00$		0.01 ± 0.00	
	Inclusve	_	0.00 ± 0.00	$0.00 \pm 0.00$	_	$0.00 \pm 0.00$
	1 lepton	_	_	_	_	_
$ZZ\rightarrow 2Q2\nu$ , amenlo pythia8	1 lepton, from W	_	_	_	_	_
. ,	1 lepton, from t	_	_	_	_	_
	≥ 2 leptons	_			_	
	$Z \rightarrow \nu \nu$	<u> </u>	$0.00 \pm 0.00$	$0.00 \pm 0.00$	<u> </u>	$0.00 \pm 0.00$
	Inclusve	$8.28 \pm 0.40$	$3.29 \pm 0.25$	$1.16 \pm 0.10$	$0.42 \pm 0.07$	$0.27 \pm 0.06$
	1 lepton	$0.20 \pm 0.08$	$0.01 \pm 0.05$	$0.00 \pm 0.05$	$0.02 \pm 0.02$	$0.00 \pm 0.00$
$t\bar{t} + V$	1 lepton, from W	$0.14 \pm 0.07$	<u> </u>	<u> </u>	$0.02 \pm 0.02$	
**   *	1 lepton, from $t$	$0.06 \pm 0.03$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	_	$0.00 \pm 0.00$
	≥ 2 leptons	$2.03 \pm 0.39$	$0.64 \pm 0.25$	$0.20 \pm 0.08$	$0.09 \pm 0.07$	$0.13 \pm 0.05$
	$Z \rightarrow \nu \nu$	$6.04 \pm 0.07$	$2.64 \pm 0.04$	$0.96 \pm 0.03$	$0.31 \pm 0.01$	$0.14 \pm 0.01$
	Inclusve	$2.15 \pm 0.39$	$0.63 \pm 0.25$	$0.19 \pm 0.09$	$0.10 \pm 0.07$	$0.13 \pm 0.05$
	1 lepton	$0.18 \pm 0.08$	_	_	$0.02 \pm 0.02$	_
47   187	1 lepton, from W	$0.14 \pm 0.07$	_	_	$0.02 \pm 0.02$	_
$t\bar{t}+W$	1 lepton, from t	$0.04 \pm 0.03$	_	_	_	_
	> 2 leptons	$1.97 \pm 0.39$	$0.63 \pm 0.25$	$0.19 \pm 0.08$	$0.09 \pm 0.07$	$0.13 \pm 0.05$
	$Z \rightarrow \nu \nu$	I	_	_		_
	Inclusve	$1.87 \pm 0.38$	$0.36 \pm 0.22$	$0.19 \pm 0.09$	$0.10 \pm 0.07$	$0.10 \pm 0.05$
	1 lepton	$0.14 \pm 0.07$	l **** ± ****		$0.02 \pm 0.02$	
	1 lepton, from W	$0.14 \pm 0.07$ $0.14 \pm 0.07$	_	_	$0.02 \pm 0.02$ $0.02 \pm 0.02$	_
$t\bar{t} + W \rightarrow \ell\nu$ , amenlo pythia8	1 lepton, from t		_	_		_
	≥ 2 leptons	$1.73 \pm 0.38$	$0.36 \pm 0.21$	$0.19 \pm 0.08$	$0.09 \pm 0.07$	$0.10 \pm 0.05$
	$Z \rightarrow \nu \nu$	1	l 5.55 ± 5.21	1		
	$L \rightarrow \nu \bar{\nu}$	I .	I	I	Continu	ed on next page
					Continu	еч оп пехт раде

	Table 4 – continued from previous page						
		≥4jets	≥4jets	≥4jets	≥4jets	≥4jets	
Sample	Classification	MT2W≥ 200	$MT2W \ge 200$	$MT2W \ge 200$	$MT2W \ge 200$	$MT2W \ge 200$	
		250 < MET < 350	350 < MET < 450	450 < MET < 550	550 < MET < 650	MET > 650	
	Inclusve	0.28 ± 0.09	$0.27 \pm 0.12$	_		$0.03 \pm 0.03$	
	1 lepton	0.04 + 0.03	0.27 ± 0.12	_	_	0.03 ± 0.03	
	1 lepton from W	0.04 ± 0.03		_	_	_	
$t\bar{t} + W \rightarrow QQ$ , amenlo pythia8	1 lepton, from t	0.04 + 0.03	_	_	_	_	
				_	_		
	≥ 2 leptons	$0.24 \pm 0.09$	$0.27 \pm 0.12$	_	_	$0.03 \pm 0.03$	
	$Z \rightarrow \nu \nu$						
	Inclusve	$6.13 \pm 0.07$	$2.66 \pm 0.04$	$0.97 \pm 0.03$	$0.31 \pm 0.01$	$0.14 \pm 0.01$	
	1 lepton	$0.02 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	_	$0.00 \pm 0.00$	
$t\bar{t} + Z$	1 lepton, from W	_			_		
	1 lepton, from $t$	$0.02 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	<del>-</del>	$0.00 \pm 0.00$	
	≥ 2 leptons	$0.06 \pm 0.01$	$0.01 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	
	$Z \rightarrow \nu \nu$	$6.04 \pm 0.07$	$2.64 \pm 0.04$	$0.96 \pm 0.03$	$0.31 \pm 0.01$	$0.14 \pm 0.01$	
	Inclusve	$6.13 \pm 0.07$	$2.66 \pm 0.04$	$0.97 \pm 0.03$	$0.31 \pm 0.01$	$0.14 \pm 0.01$	
	1 lepton	$0.02 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	_	$0.00 \pm 0.00$	
$t\bar{t} + Z$ , madgraph	1 lepton, from W	_	_	_	_	_	
tt + Z, maugraph	1 lepton, from $t$	$0.02 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	_	$0.00 \pm 0.00$	
	≥ 2 leptons	$0.06 \pm 0.01$	$0.01 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	
	$Z \rightarrow \nu \nu$	$6.04 \pm 0.07$	$2.64 \pm 0.04$	$0.96 \pm 0.03$	$0.31 \pm 0.01$	$0.14 \pm 0.01$	
	Inclusve	$0.10 \pm 0.16$	_	$0.02 \pm 0.02$	_	$0.01 \pm 0.01$	
	1 lepton	_	_	_	_	_	
$t\bar{t} + Z \rightarrow QQ$ , amenlo pythia8	1 lepton, from W	_	_	_	_	_	
$tt + Z \rightarrow QQ$ , amenio pytnias	1 lepton, from $t$	_	_	_	_	_	
	> 2 leptons	$0.10 \pm 0.16$	_	$0.02 \pm 0.02$	_	$0.01 \pm 0.01$	
	$Z \rightarrow \nu \nu$	_	_	_	_	_	
	Inclusve	$7.24 \pm 0.72$	$2.53 \pm 0.49$	$1.07 \pm 0.28$	$0.11 \pm 0.18$	$0.16 \pm 0.11$	
	1 lepton	_	_	_	_	_	
	1 lepton, from W	_	_	_	_	_	
$t\bar{t} + Z \rightarrow 2\ell 2\nu$ , amenlo pythia8	1 lepton, from t	I —	_	_	_	_	
	> 2 leptons	$0.31 \pm 0.18$	$0.06 \pm 0.10$	$0.02 \pm 0.04$	_	_	
	$Z \rightarrow \nu \nu$	$6.92 \pm 0.69$	$2.47 \pm 0.48$	$1.05 \pm 0.28$	$0.11 \pm 0.18$	$0.16 \pm 0.11$	

CR0b, Nominal Systematic, Yield Table for Input Samples

CR0b, Nominal Systematic, Yield Table for Input Samples					
		2jets	2jets	2jets	
Sample	Classification	modTopness≥ 6.4	modTopness≥ 6.4	modTopness≥ 6.4	
		250 < MET < 350	350 < MET < 450	MET > 450	
Data, single $e/\mu$ , MET	Inclusve	$371.00 \pm 19.26$	$131.00 \pm 11.45$	$93.00 \pm 9.64$	
	Inclusve	$334.79 \pm 17.13$	$93.61 \pm 8.88$	$41.77 \pm 3.73$	
	1 lepton	$240.53 \pm 13.58$	$67.05 \pm 6.44$	$31.41 \pm 3.57$	
All Background	1 lepton, from W	$240.12 \pm 13.57$	$66.98 \pm 6.44$	$31.35 \pm 3.57$	
	1 lepton, from t	$0.41 \pm 0.34$	$0.07 \pm 0.07$	$0.06 \pm 0.06$	
	≥ 2 leptons	$60.41 \pm 10.19$	$14.23 \pm 5.98$	$2.55 \pm 0.62$	
	$Z \rightarrow \nu \nu$	$33.85 \pm 2.28$	$12.33 \pm 1.23$	$7.82 \pm 0.88$	
	Inclusve	$43.56 \pm 2.18$	$4.82 \pm 0.69$	$0.73 \pm 0.28$	
	1 lepton	$0.41 \pm 0.34$	$0.07 \pm 0.07$	$0.06 \pm 0.06$	
$tar{t}$	1 lepton, from W	_	<del>_</del>	_	
tt.	1 lepton, from $t$	$0.41 \pm 0.34$	$0.07 \pm 0.07$	$0.06 \pm 0.06$	
	> 2 leptons	$43.15 \pm 2.16$	$4.76 \pm 0.69$	$0.67 \pm 0.27$	
	$Z \rightarrow \nu \nu$	_	_	_	
	Inclusve	$0.33 \pm 0.33$	_	_	
	1 lepton	$0.33 \pm 0.33$	<u> </u>	_	
	1 lepton, from W			_	
$t\bar{t}$ , single lepFromT, madgraph pythia8	1 lepton, from t	$0.33 \pm 0.33$		_	
	≥ 2 leptons	0.55 ± 0.55		_	
	$Z \rightarrow \nu \nu$	_	_		
		0.08 ± 0.08	0.07 ± 0.07	0.06 ± 0.06	
	Inclusve	0.08 ± 0.08	$0.07 \pm 0.07$	0.06 ± 0.06	
	1 lepton	$0.08 \pm 0.08$	$0.07 \pm 0.07$	$0.06 \pm 0.06$	
$t\bar{t}$ , single lepFromTbar, madgraph pythia8, ext1	1 lepton, from W				
,	1 lepton, from t	$0.08 \pm 0.08$	$0.07 \pm 0.07$	$0.06 \pm 0.06$	
	≥ 2 leptons	_	<del></del>	_	
	$Z \rightarrow \nu \nu$		<del>_</del>		
	Inclusve	$43.15 \pm 2.16$	$4.76 \pm 0.69$	$0.67 \pm 0.27$	
	1 lepton	_	_	_	
$t\bar{t}$ , diLepton, madgraph pythia8, ext1	1 lepton, from W	_	_	_	
	1 lepton, from $t$	_	<del></del>	<del>-</del>	
	$\geq$ 2 leptons	$43.15 \pm 2.16$	$4.76 \pm 0.69$	$0.67 \pm 0.27$	
	$Z \rightarrow \nu \nu$	_	<u> </u>	<u>—</u>	
	Inclusve	$3.71 \pm 1.87$	_	_	
	1 lepton	_	_	_	
	1 lepton, from W	_	_	_	
single t	1 lepton, from $t$	_	_	_	
	> 2 leptons	$3.71 \pm 1.87$	_	_	
	$Z \rightarrow \nu \nu$		<u> </u>	_	
	Inclusve	$3.71 \pm 1.87$	_	_	
	1 lepton		_	_	
	1 lepton, from W			_	
single $t \ t - W$ -channel	1 lepton, from t			_	
	≥ 2 leptons	$3.71 \pm 1.87$		_	
	$Z \rightarrow \nu \nu$	3.71 ± 1.07		_	
	Inclusve	_	_		
		_	_	_	
	1 lepton 1 lepton, from W	_	_	_	
single $t$ , $t - W$ -channel, powheg pythia8		_	_	_	
	1 lepton, from t	_	_	_	
	≥ 2 leptons	_		_	
	$Z \rightarrow \nu \nu$				
	Inclusve	3.71 ± 1.87		_	
	1 lepton			_	
single $\bar{t}$ , $t-W$ -channel, powheg pythia8		_	_	_	
single $t$ , $t - w$ -channel, powneg pythias	1 lepton, from W			_	
single $t$ , $t - w$ -channel, powneg pythias	1 lepton, from t		_		
single $t$ , $t-w$ -channel, powneg pythias	1 lepton, from $t$ $\geq$ 2 leptons	3.71 ± 1.87	_ _	_	
single t, t - w-channel, powneg pythias	1 lepton, from $t$ $\geq$ 2 leptons $Z \rightarrow \nu \nu$	3.71 ± 1.87		<u> </u>	
single $t$ , $t-w$ -channel, powneg pythias	1 lepton, from $t$ $\geq 2$ leptons $Z \rightarrow \nu \nu$ Inclusve	3.71 ± 1.87 —	— — — —	_ _ _	
single $t$ , $t-w$ -channel, powneg pythias	1 lepton, from $t$ $\geq 2$ leptons $Z \rightarrow \nu \nu$	3.71 ± 1.87		<u>–</u> –	
	1 lepton, from $t$ $\geq 2$ leptons $Z \rightarrow \nu \nu$ Inclusve	3.71 ± 1.87 ————————————————————————————————————		_ _ _ _ _	
single $t,\ t-W$ -channel, powneg pythias single $t$ non $t-W$ -channel	$1 \text{ lepton, from } t$ $\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$ Inclusve $1 \text{ lepton}$	3.71 ± 1.87 ————————————————————————————————————			
	$\begin{array}{c} 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \\ Inclusve \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \end{array}$	3.71 ± 1.87 — — — — — — — — — — — — — — — — — — —		<u> </u>	
	$\begin{array}{c} 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \\ \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \end{array}$	3.71 ± 1.87 — — — — — — — — — — — — — — — — — — —			

Table 5 – continued from previous page						
Sample	Classification	$\begin{array}{c} \text{2jets} \\ \text{modTopness} \geq 6.4 \\ 250 < MET < 350 \end{array}$	$2 \mathrm{jets}$ $\mathrm{modTopness} \geq 6.4$ $350 < MET < 450$	$\begin{array}{c} \text{2jets} \\ \text{modTopness} \geq 6.4 \\ MET > 450 \end{array}$		
	Inclusve	_	_			
	1 lepton	_	_	_		
	1 lepton, from W					
single t, s-channel, amenlo pythia8	1 lepton, from t	_	_	_		
	> 2 leptons	_	_	_		
		_	_	_		
	$Z \rightarrow \nu \nu$					
	Inclusve	$229.35 \pm 16.52$ $229.35 \pm 13.38$	$69.50 \pm 8.66$ $63.59 \pm 6.33$	$29.21 \pm 3.46$ $29.21 \pm 3.46$		
	1 lepton					
V + Jets	1 lepton, from W	229.35 ± 13.38	$63.59 \pm 6.33$	$29.21 \pm 3.46$		
	1 lepton, from t					
	≥ 2 leptons	_	$5.91 \pm 5.91$	_		
	$Z \rightarrow \nu \nu$	_	<del>-</del>	_		
	Inclusve	_	$5.91 \pm 5.91$	_		
	1 lepton	_	_	_		
$DY+Jets \rightarrow \ell\ell$	1 lepton, from W	_	_	_		
= - 1 ***** ***	1 lepton, from t	_	l <del>, _</del>	_		
	≥ 2 leptons	_	$5.91 \pm 5.91$	_		
	$Z \rightarrow \nu \nu$					
	Inclusve					
	1 lepton	_	_	_		
DY+Jets→ ℓℓ, M10to50, amcnlo pythia8	1 lepton, from W	_	_	_		
0	1 lepton, from t	_	_	_		
	≥ 2 leptons	_	_	_		
	$Z \rightarrow \nu \nu$	_	<u> </u>	_		
	Inclusve	_	$5.91 \pm 5.91$	_		
	1 lepton	_	_	_		
DY+Jets→ ℓℓ, M50, amenlo pythia8	1 lepton, from W	_	_	_		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 lepton, from t	_		_		
	≥ 2 leptons	_	$5.91 \pm 5.91$	_		
	$Z \rightarrow \nu \nu$	-	-			
	Inclusve	229.35 ± 13.38	63.59 ± 6.33	29.21 ± 3.46		
	1 lepton	$229.35 \pm 13.38$	$63.59 \pm 6.33$	$29.21 \pm 3.46$		
$W+Jets \rightarrow \ell \nu$	1 lepton, from W	$229.35 \pm 13.38$	$63.59 \pm 6.33$	$29.21 \pm 3.46$		
	1 lepton, from t	_	_	_		
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	_	_	_		
	Inclusve	62.02 ± 8.96	11.78 ± 3.76	3.78 ± 1.89		
	1 lepton 1 lepton, from W	$62.02 \pm 8.96$ $62.02 \pm 8.96$	$11.78 \pm 3.76$ $11.78 \pm 3.76$	$3.78 \pm 1.89$ $3.78 \pm 1.89$		
W+Jets $\rightarrow \ell \nu$ , 100 < $HT$ < 200, madgraph pythia8	1 lepton, from t	62.02 ± 8.96	11.78 ± 3.76	3.10 ± 1.09		
	> 2 leptons	_	_	_		
	$Z \rightarrow \nu \nu$	_	_	_		
	Inclusve	139.55 ± 9.19	29.95 ± 3.97	8.08 ± 1.91		
	1 lepton	$139.55 \pm 9.19$ $139.55 \pm 9.19$	$29.95 \pm 3.97$ $29.95 \pm 3.97$	8.08 ± 1.91 8.08 ± 1.91		
	1 lepton from W	$139.55 \pm 9.19$ $139.55 \pm 9.19$	29.95 ± 3.97 29.95 ± 3.97	8.08 ± 1.91 8.08 ± 1.91		
W+Jets $\rightarrow \ell \nu$ , 200 $< HT < 400$ , madgraph pythia8	1 lepton, from t	139.33 ± 9.19	29.90 ± 3.91	0.00 ± 1.91		
	> 2 leptons					
	$Z \rightarrow \nu \nu$		_	_		
	Inclusve	$21.43 \pm 3.75$	17.79 ± 3.15	9.08 ± 2.09		
	1 lepton	21.43 ± 3.75	17.79 ± 3.15	9.08 ± 2.09		
	1 lepton, from W	21.43 ± 3.75	17.79 ± 3.15	9.08 ± 2.09		
W+Jets $\rightarrow \ell \nu,  400 < HT < 600,  {\rm madgraph  pythia8}$	1 lepton, from t	1 21.10 ± 0.13	1	l 5.00 ± 2.00		
	> 2 leptons	_	_	_		
	$Z \rightarrow \nu \nu$	_	_	_		
	Inclusve	$4.52 \pm 0.61$	$3.08 \pm 0.47$	$5.63 \pm 0.58$		
	1 lepton	$4.52 \pm 0.61$ $4.52 \pm 0.61$	$3.08 \pm 0.47$	5.63 ± 0.58		
	1 lepton, from W	$4.52 \pm 0.61$	3.08 ± 0.47	5.63 ± 0.58		
W+Jets $\rightarrow \ell \nu$ , 600 $< HT < 800$ , madgraph pythia8	1 lepton, from t					
	> 2 leptons	_	_	_		
	$Z \rightarrow \nu \nu$	_	_	_		
		•	Cor	ntinued on next page		

Sample Classification mod Types 5, 6, 4 mod Types 5, 4 m	Tabl	e 5 – continued from			
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			2jets	2jets	2jets
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Sample	Classification			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			250 < MET < 350	350 < MET < 450	MET > 450
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	W_lets_ /v 800 < HT < 1200 madgraph pythia8		$1.52 \pm 0.18$	$0.76 \pm 0.12$	$2.26 \pm 0.19$
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	W   vece · es, eee < 111 < 1200, maagraph pytmae		_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_
$ \begin{array}{c} 1 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 0.07 \pm 0.01 \\ 0.02 \pm 0.01 \\ 0.02$			_		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	W+Jets $\rightarrow \ell \nu$ , 1200 < HT < 2500, madgraph pythia8		$0.24 \pm 0.17$	$0.20 \pm 0.14$	$0.35 \pm 0.18$
$W+ Jets \rightarrow \ell \nu, 2500 < HT < Inf, madgraph pythias \\   Incluse   1 lepton   1 lepton   0.07 \pm 0.01   0.02 \pm 0.01  $	, , , , , , , , , , , , , , , , , , ,		_	_	_
$ \text{W+Jets} \rightarrow \ell \nu, 2500 < HT < Inf, \text{ madgraph pythia8} \\ \text{W} + \text{Jets} \rightarrow \ell \nu, 2500 < HT < Inf, \text{ madgraph pythia8} \\ \text{W} + \text{Jets} \rightarrow \ell \nu, 2500 < HT < Inf, \text{ madgraph pythia8} \\ \text{Ilepton, from $k$} \\$			_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	W+Jets $\rightarrow \ell \nu$ , 2500 $< HT < Inf$ , madgraph pythia8		0.07 ± 0.01	0.02 ± 0.01	0.02 ± 0.01
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $					I = =
Rare $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_
Rare $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			58.17 ± 3.47	$19.29 \pm 1.84$	11.83 ± 1.36
$ \text{Rare } \\ \text{Rare } \\ \text{Rare } \\ \begin{array}{c} 1 \text{ lepton, from $W$} \\ 1 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \\ 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \\ 33.85 \pm 2.28 \\ 33.55 \pm 1.33 \\ 3.57 \pm 0.64 \\ 1.87 \pm 0.56 \\ 1.87 \pm 0.58 \\ \\ 1.82 \pm 0.88 \\ \\ 1.82 \pm 0.8$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	_				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Rare				
Inclusve   Inclus			$13.55 \pm 1.33$	$3.57 \pm 0.64$	$1.87 \pm 0.56$
diBoson					
diBoson		Inclusve	$56.71 \pm 3.47$	$18.92 \pm 1.84$	$11.63 \pm 1.36$
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		1 lepton			$2.11 \pm 0.86$
$VW \rightarrow \ell \nu q q, \text{ powheg} \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	L'D	1 lepton, from W	$10.77 \pm 2.25$	$3.37 \pm 1.20$	$2.11 \pm 0.86$
$ \begin{array}{ c c c c c c } \hline Z \to \nu\nu & 32.71 \pm 2.28 & 12.01 \pm 1.23 & 7.66 \pm 0.88 \\ \hline & Inclusve & 21.56 \pm 2.59 & 6.16 \pm 1.35 & 3.52 \pm 1.02 \\ \hline & 1 \ lepton & 8.94 \pm 2.24 & 2.93 \pm 1.19 & 1.71 \pm 0.86 \\ \hline & 1 \ lepton, from W & 8.94 \pm 2.24 & 2.93 \pm 1.19 & 1.71 \pm 0.86 \\ \hline & 1 \ lepton, from W & 8.94 \pm 2.24 & 2.93 \pm 1.19 & 1.71 \pm 0.86 \\ \hline & 1 \ lepton, from W & 8.94 \pm 2.24 & 2.93 \pm 1.19 & 1.71 \pm 0.86 \\ \hline & Z \to \nu\nu & 12.62 \pm 1.31 & 3.24 \pm 0.63 & 1.80 \pm 0.56 \\ \hline & I \ lepton & 1.80 \pm 0.56 & & - & - \\ \hline & 1 \ lepton, from W & - & - & - & - \\ \hline & 1 \ lepton, from W & - & - & - & - \\ \hline & 1 \ lepton, from W & 1.262 \pm 1.31 & 3.24 \pm 0.63 & 1.80 \pm 0.56 \\ \hline & 2 \ leptons & 1.262 \pm 1.31 & 3.24 \pm 0.63 & 1.80 \pm 0.56 \\ \hline & 2 \ leptons & 1.262 \pm 1.31 & 3.24 \pm 0.63 & 1.80 \pm 0.56 \\ \hline & 2 \ leptons & 1.262 \pm 1.31 & 3.24 \pm 0.63 & 1.80 \pm 0.56 \\ \hline & 2 \ leptons & 1.262 \pm 1.31 & 3.24 \pm 0.63 & 1.80 \pm 0.56 \\ \hline & 2 \ leptons & 1.262 \pm 1.31 & 3.24 \pm 0.63 & 1.80 \pm 0.56 \\ \hline & 1 \ lepton, from W & 1.894 \pm 2.24 & 2.93 \pm 1.19 & 1.71 \pm 0.86 \\ \hline & 1 \ lepton, from W & 8.94 \pm 2.24 & 2.93 \pm 1.19 & 1.71 \pm 0.86 \\ \hline & 1 \ lepton, from W & 8.94 \pm 2.24 & 2.93 \pm 1.19 & 1.71 \pm 0.86 \\ \hline & 1 \ lepton, from W & 8.94 \pm 2.24 & 2.93 \pm 1.19 & 1.71 \pm 0.86 \\ \hline & 1 \ lepton, from W & 8.94 \pm 2.24 & 2.93 \pm 1.19 & 1.71 \pm 0.86 \\ \hline & 1 \ lepton, from W & 8.94 \pm 2.24 & 2.93 \pm 1.19 & 1.71 \pm 0.86 \\ \hline & 1 \ lepton, from W & 8.94 \pm 2.24 & 2.93 \pm 1.19 & 1.71 \pm 0.86 \\ \hline & 1 \ lepton, from W & 8.94 \pm 2.24 & 2.93 \pm 1.19 & 1.71 \pm 0.86 \\ \hline & 1 \ lepton, from W & 8.94 \pm 2.24 & 2.93 \pm 1.19 & 1.71 \pm 0.86 \\ \hline & 1 \ lepton, from W & 8.94 \pm 2.24 & 2.93 \pm 1.19 & 1.71 \pm 0.86 \\ \hline & 1 \ lepton, from W & 8.94 \pm 2.24 & 2.93 \pm 1.19 & 1.71 \pm 0.86 \\ \hline & 1 \ lepton, from W & 8.94 \pm 2.24 & 2.93 \pm 1.19 & 1.71 \pm 0.86 \\ \hline & 1 \ lepton, from W & 8.94 \pm 2.24 & 2.93 \pm 1.19 & 1.71 \pm 0.86 \\ \hline & 1 \ lepton, from W & 1.83 \pm 0.27 & 0.44 \pm 0.13 & 0.40 \pm 0.10 \\ \hline & 2 \ leptons & 0.56 \pm 0.17 & 0.30 \pm 0.12 & 0.05 \pm 0.04 \\ \hline & 2 \ leptons & 0.56 \pm 0.17 & 0.30 \pm 0.12 & 0.05 \pm 0.04 \\ \hline & 2 \ leptons & 0.56 \pm 0.17 & 0.30 \pm$	diBoson	1 lepton, from t	_		_
$WW \qquad   1 \text{ lepton}   1 \text{ lepton}$					
$WW \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		$Z \rightarrow \nu \nu$	$32.71 \pm 2.28$	$12.01 \pm 1.23$	$7.66 \pm 0.88$
$WW \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		Inclusve			
$WW \rightarrow VV = $					
$WW \to 2\ell 2\nu, \text{ powheg} \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$	WW		$8.94 \pm 2.24$	$2.93 \pm 1.19$	$1.71 \pm 0.86$
$WW \to 2\ell 2\nu \text{, powheg} \qquad \begin{array}{ c c c c c c }\hline & Z \to \nu\nu & - & - & - & - & - \\ & & & & & & & & &$					
$WW \to 2\ell 2\nu \text{, powheg} \qquad \begin{array}{ c c c c c }\hline & \text{Inclusve} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} & 12.62 \pm 1.31 \\ & \geq 2 \text{ leptons} & 12.62 \pm 1.31 \\ & \geq 2 \text{ leptons} & 12.62 \pm 1.31 \\ & \geq 2 \text{ leptons} & 12.62 \pm 1.31 \\ & \geq 2 \text{ leptons} & 12.62 \pm 1.31 \\ & \geq 2 \text{ leptons} & 12.62 \pm 1.31 \\ & \geq 2 \text{ leptons} & 12.62 \pm 1.31 \\ & \geq 2 \text{ leptons} & 12.62 \pm 1.31 \\ & \geq 2 \text{ leptons} & 12.62 \pm 1.31 \\ & \geq 2 \text{ leptons} & 12.62 \pm 1.31 \\ & \geq 2 \text{ leptons} & 12.62 \pm 1.31 \\ & \geq 2 \text{ leptons} & 1.80 \pm 0.56 \\ & \geq 2 \text{ leptons} & 1.80 \pm 0.56 \\ & \geq 2 \text{ leptons} & 1.80 \pm 0.27 \\ & \geq 2 \text{ leptons} & - & - & - \\ & \geq 2 \text{ leptons} & - & - & - \\ & \geq 2 \text{ leptons} & 1.83 \pm 0.27 \\ & \geq 2 \text{ leptons} & 0.56 \pm 0.17 \\ & \geq 2 \text{ leptons} & 0.56 \pm 0.17 \\ & \geq 2 \text{ leptons} & 0.56 \pm 0.17 \\ & \geq 2 \text{ leptons} & 0.51 \pm 0.16 \\ & \geq 2 $			$12.62 \pm 1.31$	$3.24 \pm 0.63$	$1.80 \pm 0.56$
$WW \to 2\ell 2\nu \text{, powheg} \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$WW \to 2\ell 2\nu \text{, powheg} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \to \nu \nu \\ \\ \\ WW \to \ell \nu qq \text{, powheg} \\ \end{array} \\ \begin{array}{c} \text{Inclusev} \\ 1 \text{ lepton } \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ \\ 1 \text{ lepton, from } W \\ 8.94 \pm 2.24 \\ 2.93 \pm 1.19 \\ 1.71 \pm 0.86 \\ 2.93 \pm 1.19 \\ 1.71 \pm 0.86 \\ 2.93 \pm 1.19 \\ 1.71 \pm 0.86 \\ 1.1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ Z \to \nu \nu \\ \\ WZ \\ \end{array} \\ \begin{array}{c} \text{Inclusev} \\ 1 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 0.51 \pm 0.16 \\ 0.29 \pm 0.12 \\ 0.04 \pm 0.04 \\ 0.04 $			$12.62 \pm 1.31$	$3.24 \pm 0.63$	$1.80 \pm 0.56$
$WW \to 2\ell 2\nu, \text{ powneg} \\ \begin{array}{c} 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \to \nu \nu \\ \end{array} \\ \begin{array}{c} 1 \text{ lost on} \\ Z \to \nu \nu \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } t \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \to \nu \nu \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ Z \to \nu \nu \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ 2 \text{ leptons} \\ 0.56 \pm 0.17 \\ 0.30 \pm 0.12 \\ 0.05 \pm 0.04 \\ 0.04 \pm 0.04 \\ $			_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$WW \rightarrow 2\ell 2\nu$ , powheg			_	_
$WW \rightarrow \ell \nu qq \text{, powheg} \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	• • •		12.62 ± 1.21	3 24 ± 0.63	1 80 + 0 50
$WW \to \ell \nu q q, \ \text{powheg} \\ \begin{array}{c} \text{Inclusve} \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 2 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 2 \ \text{lepton, from } W \\ 2 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 2 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 2 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 2 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 0.51 \pm 0.16 \\ 0.29 \pm 0.12 \\ 0.04 \pm 0.04 \\ $			12.02 ± 1.31	3.24 ± 0.03	1.80 ± 0.56
$WW \to \ell \nu qq, \ \text{powheg} \qquad \begin{array}{c} 1 \ \text{lepton} \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } t \\ \geq 2 \ \text{leptons} \\ Z \to \nu \nu \\ \end{array} \qquad \begin{array}{c} - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - $			8 94 ± 2 24	2 03 ± 1 10	171 ± 0.96
$WW \to \ell \nu qq, \ \text{powheg} \\ \begin{array}{c} 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } t \\ \geq 2 \ \text{lepton, from } t \\ \geq 2 \ \text{lepton, from } t \\ \geq 2 \ \text{lepton, from } t \\ & -$					
$WZ \to 3\ell\nu, \text{ powheg} \\ \begin{array}{c} 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \to \nu\nu \\ \end{array} \\ \begin{array}{c} Incluse \\ 1 \text{ lepton, from } W \\ Z \to \nu\nu \\ \end{array} \\ \begin{array}{c} Incluse \\ 1 \text{ lepton, from } W \\ Z \to \nu\nu \\ \end{array} \\ \begin{array}{c} Incluse \\ 1 \text{ lepton, from } W \\ Z \to \nu\nu \\ \end{array} \\ \begin{array}{c} Incluse \\ 1 \text{ lepton, from } W \\ Z \to \nu\nu \\ \end{array} \\ \begin{array}{c} Incluse \\ 1 \text{ lepton, from } W \\ Z \to \nu\nu \\ \end{array} \\ \begin{array}{c} Incluse \\ 1 \text{ lepton, from } W \\ Z \to \nu\nu \\ \end{array} \\ \begin{array}{c} Incluse \\ 1 \text{ lepton, from } W \\ Z \to \nu\nu \\ \end{array} \\ \begin{array}{c} Incluse \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ \end{array} \\ \begin{array}{c} Incluse \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ - \\ - \\ 2 \text{ lepton, from } W \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$WW \rightarrow \ell \nu qq$ , powheg		0.04 1 2.24	2.55 ± 1.15	1.77 ± 0.00
$WZ = \begin{bmatrix} Z \to \nu \nu & - & - & - & - \\ & Inclusve & 33.87 \pm 2.31 & 12.41 \pm 1.25 & 7.91 \pm 0.89 \\ 1 \ lepton & 1.83 \pm 0.27 & 0.44 \pm 0.13 & 0.40 \pm 0.10 \\ 1 \ lepton, from W & 1.83 \pm 0.27 & 0.44 \pm 0.13 & 0.40 \pm 0.10 \\ 1 \ lepton, from t & - & - & - & - \\ & \geq 2 \ leptons & 0.56 \pm 0.17 & 0.30 \pm 0.12 & 0.05 \pm 0.04 \\ Z \to \nu \nu & 31.48 \pm 2.28 & 11.66 \pm 1.23 & 7.47 \pm 0.88 \\ Inclusve & 0.51 \pm 0.16 & 0.29 \pm 0.12 & 0.04 \pm 0.04 \\ 1 \ lepton & - & - & - & - \\ 1 \ lepton, from W & - & - & - & - \\ 1 \ lepton, from W & - & - & - & - \\ 2 \ leptons & 0.51 \pm 0.16 & 0.29 \pm 0.12 & 0.04 \pm 0.04 \\ Z \to \nu \nu & - & - & - & - \\ 2 \ leptons & 0.51 \pm 0.16 & 0.29 \pm 0.12 & 0.04 \pm 0.04 \\ Z \to \nu \nu & - & - & - & - & - \\ - & - & - & - & -$			_	_	_
$WZ = \begin{cases} & \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ 2 \text{ leptons} \\ 2 \text{ leptons} \\ 2 \text{ leptons} \\ 2 \text{ lepton} \\ 3 \text{ logoulus } 0.56 \pm 0.17 \\ 3 \text{ logoulus } 0.30 \pm 0.12 \\ 3 \text{ logoulus } 0.30 \pm 0.12 \\ 3 \text{ logoulus } 0.51 \pm 0.16 \\ 1 \text{ lepton, from } W \\ 0.51 \pm 0.16 \\ 0.29 \pm 0.12 \\ 0.04 \pm 0.04 \\ 0.04 $			_	_	_
$WZ \\ \begin{cases} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ 1 \text{ lepton, from } t \\ 2 \text{ leptons, } \\ Z \rightarrow \nu \nu \end{cases} \\ \begin{bmatrix} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ 2 \text{ leptons} \end{bmatrix} \\ \begin{bmatrix} 1.83 \pm 0.27 \\ 0.44 \pm 0.13 \\ 0.40 \pm 0.10 \\ 0.40 \pm 0.10 \\ 0.40 \pm 0.10 \\ 0.56 \pm 0.17 \\ 0.30 \pm 0.12 \\ 0.05 \pm 0.04 \\ 0.16 \pm 0.12 \\ 0.05 \pm 0.04 \\ 0.16 \pm 0.12 \\ 0.04 \pm 0.04 \\ 0.16 \pm 0.12 \\ 0.1$			$33.87 \pm 2.31$	$12.41 \pm 1.25$	$7.91 \pm 0.89$
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	WZ				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			$0.56 \pm 0.17$	$0.30 \pm 0.12$	$0.05 \pm 0.04$
$WZ \rightarrow 3\ell\nu, \text{ powheg pythia8} \\ \begin{array}{ccccccccccccccccccccccccccccccccccc$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		Inclusve			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_		_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	WZ→3/µ powheg pythia8	1 lepton, from W	_	_	_
$Z \rightarrow \nu \nu$ — — — —	** 2 - oce, powneg pytimas		_	<del>-</del>	l —
			$0.51 \pm 0.16$	$0.29 \pm 0.12$	$0.04 \pm 0.04$
Continued on next page		$Z \rightarrow \nu \nu$	_		
				Cor	ntinued on next page

Tab	Table $5$ – continued from previous page							
		2jets	2jets	2jets				
Sample	Classification	modTopness≥ 6.4	modTopness≥ 6.4	modTopness≥ 6.4				
		250 < MET < 350	350 < MET < 450	MET > 450				
	Inclusve	$0.05 \pm 0.04$	$0.01 \pm 0.01$	$0.01 \pm 0.01$				
	1 lepton	_	_	_				
$WZ\rightarrow 2\ell 2Q$ , amenlo pythia8	1 lepton, from W	_	_	_				
**	1 lepton, from t	0.05 ± 0.04	$0.01 \pm 0.01$	0.01 ± 0.01				
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	0.05 ± 0.04	0.01 ± 0.01	0.01 ± 0.01				
	Inclusve	1.83 ± 0.27	$0.44 \pm 0.13$	$0.40 \pm 0.10$				
	1 lepton	$1.83 \pm 0.27$ $1.83 \pm 0.27$	$0.44 \pm 0.13$	$0.40 \pm 0.10$ $0.40 \pm 0.10$				
	1 lepton, from W	1.83 ± 0.27	$0.44 \pm 0.13$	0.40 ± 0.10				
$WZ \rightarrow \ell \nu 2Q$ , amcnlo pythia8	1 lepton, from t		= -					
	≥ 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$	_	_	_				
	Inclusve	$31.48 \pm 2.28$	$11.66 \pm 1.23$	$7.47 \pm 0.88$				
	1 lepton	_	_	_				
$WZ\rightarrow 1\ell 3\nu$ , amenlo pythia8	1 lepton, from W	_	_	_				
I I I I I I I I I I I I I I I I I I I	1 lepton, from t	_	<del>-</del>	_				
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	31.48 ± 2.28	11.66 ± 1.23	$7.47 \pm 0.88$				
	$Z \rightarrow \nu \nu$ Inclusve	1.27 ± 0.07	$0.35 \pm 0.03$	$0.20 \pm 0.02$				
	1 lepton	1.27 ± 0.07	0.33 ± 0.03	0.20 ± 0.02				
	1 lepton, from W	_	_	_				
ZZ	1 lepton, from t	_	_	_				
	≥ 2 leptons	$0.04 \pm 0.04$	$0.00 \pm 0.01$	_				
	$Z \rightarrow \nu \nu$	$1.23 \pm 0.05$	$0.35 \pm 0.03$	$0.20 \pm 0.02$				
	Inclusve	$0.04 \pm 0.04$	$0.00 \pm 0.01$	_				
	1 lepton	_	_	_				
$ZZ\rightarrow 2\ell 2Q$ , amcnlo pythia8	1 lepton, from W	_	_	_				
• • • • • • • • • • • • • • • • • • • •	1 lepton, from $t$ > 2 leptons	$0.04 \pm 0.04$	$0.00 \pm 0.01$	_				
	$Z \rightarrow \nu \nu$	0.04 ± 0.04	0.00 ± 0.01					
	Inclusve	$1.18 \pm 0.04$	$0.34 \pm 0.02$	0.19 ± 0.01				
	1 lepton	I = = = = = = = = = = = = = = = = = = =						
$ZZ\rightarrow 2\ell 2\nu$ , powheg pythia8	1 lepton, from W	_	_	_				
ZZ→2εzν, powneg pythias	1 lepton, from t	_	_	_				
	$\geq$ 2 leptons	<del>-</del>	<del>-</del>	<u> </u>				
	$Z \rightarrow \nu \nu$	$1.18 \pm 0.04$	$0.34 \pm 0.02$	$0.19 \pm 0.01$				
	Inclusve	$0.05 \pm 0.03$	$0.01 \pm 0.02$	$0.01 \pm 0.01$				
	1 lepton 1 lepton, from W	_	<del>-</del>	_				
$ZZ\rightarrow 2Q2\nu$ , amcnlo pythia8	1 lepton, from t							
	> 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$	$0.05 \pm 0.03$	$0.01 \pm 0.02$	$0.01 \pm 0.01$				
	Inclusve	$1.47 \pm 0.14$	$0.37 \pm 0.05$	$0.20 \pm 0.03$				
	1 lepton	_	$0.03 \pm 0.03$	$0.02 \pm 0.02$				
$tar{t}+V$	1 lepton, from W	_	$0.03 \pm 0.03$	$0.02 \pm 0.02$				
	1 lepton, from t							
	≥ 2 leptons	$0.33 \pm 0.13$	$0.03 \pm 0.04$	$0.02 \pm 0.02$				
	$Z \rightarrow \nu \nu$ Inclusve	$1.14 \pm 0.03$ $0.32 \pm 0.13$	$0.31 \pm 0.02$ $0.06 \pm 0.05$	$0.16 \pm 0.01$ $0.04 \pm 0.03$				
	1 lepton	0.32 ± 0.13	$0.06 \pm 0.05$ $0.03 \pm 0.03$	$0.04 \pm 0.03$ $0.02 \pm 0.02$				
	1 lepton, from W	_	$0.03 \pm 0.03$ $0.03 \pm 0.03$	$0.02 \pm 0.02$ $0.02 \pm 0.02$				
$t \bar{t} + W$	1 lepton, from t	_						
	≥ 2 leptons	$0.32 \pm 0.13$	$0.03 \pm 0.04$	$0.02 \pm 0.02$				
	$Z \rightarrow \nu \nu$	_	_	-				
	Inclusve	$0.26 \pm 0.13$	$0.06 \pm 0.04$	$0.02 \pm 0.02$				
	1 lepton	_	$0.03 \pm 0.03$	$0.02 \pm 0.02$				
$t\bar{t} + W \rightarrow \ell\nu$ , amenlo pythia8	1 lepton, from W	_	$0.03 \pm 0.03$	$0.02 \pm 0.02$				
	1 lepton, from $t$ $\geq$ 2 leptons	0.26 ± 0.13	$0.03 \pm 0.03$	_				
	$Z \rightarrow \nu \nu$	0.20 ± 0.13	0.03 ± 0.03					
	Δ νν	I.	Cor	ntinued on next page				
			001	and page				

Table 5 - continued from previous page

$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Table 5 – continued from previous page							
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				2jets	2jets			
$t\bar{t} + W \to QQ, \text{ amenlo pythia8} \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Sample	Classification	modTopness≥ 6.4	modTopness≥ 6.4	modTopness≥ 6.4			
$t\bar{t} + W \to QQ, \text{ amenlo pythia8} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ Z \to \nu\nu \\ \\ t\bar{t} + Z \\ \\ \\ t\bar{t} + Z \\ \\ \\ t\bar{t} + Z \\ \\ \\ \\ t\bar{t} + Z \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$			250 < MET < 350	350 < MET < 450	MET > 450			
$t\bar{t} + W \to QQ, \text{ amenlo pythia8} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ Z \to \nu\nu \\ \\ t\bar{t} + Z \\ \end{array} \\ \begin{array}{c} Incluse \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ \\ Z \to \nu\nu \\ \end{array} \\ \begin{array}{c} Incluse \\ 1 \text{ lepton, from } W \\ \\ 2 \text{ leptons} \\ Z \to \nu\nu \\ \end{array} \\ \begin{array}{c} Incluse \\ 1.14 \pm 0.03 \\ 2 \text{ lepton, from } W \\ \\ 1.14 \pm 0.03 \\ 3.31 \pm 0.02 \\ 0.00 \pm 0.00 \\ 0.00 \pm 0.00 \\ 0.16 \pm 0.01 \\ 0.16 \pm 0.01 \\ 0.16 \pm 0.01 \\ 0.16 \pm 0.01 \\ 0.11 \pm 0.00 \\ 0.01 \pm 0.00 $		Inclusve	0.06 ± 0.04	_	0.02 ± 0.02			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			0.00 ± 0.01	_				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$t\bar{t} + W \rightarrow QQ$ , amcnlo pythia8		_					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			0.06 ± 0.04		0.02 ± 0.02			
$t\bar{t} + Z = \begin{cases} & I \text{lopton} \\ 1 \text{ lepton}, & I \text{ from } W \\ 1 \text{ lepton, from } W \\ - & - & - \\ 1 \text{ lepton, from } W \\ - & - & - \\ - & - & - \\ - & - & - \\ - & - &$			0.00 ± 0.04	_	0.02 ± 0.02			
$t\bar{t} + Z \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$			1 14   0 00	0.01   0.00	0.16   0.01			
$t\bar{t} + Z = \begin{cases} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \end{cases} & 0.01 \pm 0.00 \\ 1.14 \pm 0.03 & 0.31 \pm 0.02 & 0.16 \pm 0.01 \\ 1 \text{ lepton} \\ 1 \text{ lepton} \end{cases} & 0.01 \pm 0.00 \\ 1 \text{ lepton from } W \end{cases} \\ t\bar{t} + Z, \text{ madgraph} & 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \end{cases} & 0.01 \pm 0.00 \\ Z \rightarrow \nu\nu & 1.14 \pm 0.03 & 0.31 \pm 0.02 \\ 1 \text{ lepton, from } W \\ - & - & - \\ 0.00 \pm 0.00 \\ 0.00 \pm 0.00 \end{cases} \\ - & 0.00 \pm 0.00 \\ 0.01 \pm 0.00 \end{cases} \\ t\bar{t} + Z \rightarrow QQ, \text{ amenlo pythia8} & 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton from } W \\ - & - & - \\ 1 \text{ lepton, from } W \\ - & - & - \\ 1 \text{ lepton, from } W \\ - & - & - \\ 1 \text{ lepton, from } W \\ - & - & - \\ 1 \text{ lepton, from } W \\ - & - & - \\ 1 \text{ lepton, from } W \\ - & - & - \\ 1 \text{ lepton, from } W \\ - & - & - \\ 1 \text{ lepton, from } W \\ - & - & - \\ 1 \text{ lepton, from } W \\ - & - & - \\ 1 \text{ lepton, from } W \\ - & - & - \\ 1 \text{ lepton, from } W \\ - & - & - \\ 2 \text{ leptons} \\ - & - & - \\ 2 \text{ leptons} \\ - & - & - \\ 2 \text{ lepton, from } W \\ - & - & - \\ - & - & - \\ - & - & - \\ - & - &$			1.14 ± 0.03	0.31 ± 0.02	0.16 ± 0.01			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$tar{t}+Z$		_	_	_			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				_	<del></del>			
$t\bar{t} + Z,  \text{madgraph} \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$				<del>-</del>				
$t\bar{t} + Z,  \text{madgraph} \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$								
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			$1.14 \pm 0.03$	$0.31 \pm 0.02$	$0.16 \pm 0.01$			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	t++ 7 moderaph		_	_	<u> </u>			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	tt + Z, maugraph	1 lepton, from $t$	_	_	_			
$t\bar{t} + Z \rightarrow QQ, \text{ amenlo pythia8} \\ \begin{array}{c} \text{Inclusve} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ - \\ 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \end{array} \\ \begin{array}{c} \text{Inclusve} \\ - \\ 0.05 \pm 0.05 \\ - \\ - \\ 0.03 \pm 0.03 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ $		≥ 2 leptons	$0.01 \pm 0.00$	_	$0.00 \pm 0.00$			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		$Z \rightarrow \nu \nu$	$1.14 \pm 0.03$	$0.31 \pm 0.02$	$0.16 \pm 0.01$			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		Inclusve	$0.05 \pm 0.05$	$0.03 \pm 0.03$	_			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		1 lepton	_	_	_			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	17 1 7 00 1 11:0	1 lepton, from W	_	_	_			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$tt + Z \rightarrow QQ$ , amenio pytnias	1 lepton, from t	_	_	_			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			$0.05 \pm 0.05$	$0.03 \pm 0.03$	_			
$t\bar{t} + Z \rightarrow 2\ell 2\nu \text{, amcnlo pythia8} \\ \begin{array}{ccccccccccccccccccccccccccccccccccc$			_	_	_			
$t\bar{t} + Z \rightarrow 2\ell 2\nu \text{, amcnlo pythia8} \\ \begin{array}{ccccccccccccccccccccccccccccccccccc$		Inclusve	$1.07 \pm 0.25$	$0.32 \pm 0.12$	$0.25 \pm 0.09$			
$t\bar{t}+Z{\rightarrow}2\ell2\nu, \text{ amcnlo pythia8}$ 1 lepton, from $W$ — — — — — — — — — — — — — — — — — — —		1 lepton						
$tt + 2 \rightarrow 2\ell 2\nu$ , amenio pythia8	l .= . <u>.</u>		_	_	_			
$\geq$ 2 leptons 0.06 $\pm$ 0.04 — —	$tt + Z \rightarrow 2\ell 2\nu$ , amcnlo pythia8		_	_	_			
			$0.06 \pm 0.04$	_	_			
		$Z \rightarrow \nu \nu$	1.01 ± 0.25	$0.32 \pm 0.12$	$0.25 \pm 0.09$			

CR0b, Nominal Systematic, Yield Table for Input Samples

CR	Ub, Nominal Systema	tic, Yield Table for Inpu			
9 1	C1 :C: .:	3jets	3jets	3jets	3jets
Sample	Classification	MT2W≥200	MT2W≥200	MT2W≥200	MT2W≥200
		250 < MET < 350	350 < MET < 450	450 < MET < 550	MET > 550
Data, single $e/\mu$ , MET	Inclusve	$164.00 \pm 12.81$	$48.00 \pm 6.93$	$17.00 \pm 4.12$	$25.00 \pm 5.00$
	Inclusve	$148.16 \pm 7.88$	55.95 ± 4.59	14.61 ± 2.14	13.11 ± 1.73
	1 lepton	$94.07 \pm 7.35$	$40.07 \pm 4.41$	$11.72 \pm 2.05$	$9.79 \pm 1.66$
	1 lepton from W	$93.41 \pm 7.34$	$40.07 \pm 4.41$ $40.07 \pm 4.41$	$11.72 \pm 2.05$ $11.72 \pm 2.05$	$9.79 \pm 1.66$ $9.52 \pm 1.65$
All Background	1 lepton, from t	$0.66 \pm 0.36$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.27 \pm 0.21$
	≥ 2 leptons	$35.97 \pm 2.42$	8.12 ± 0.91	1.08 ± 0.30	$0.27 \pm 0.21$ $0.88 \pm 0.25$
	$Z \rightarrow \nu \nu$	$18.13 \pm 1.51$	7.77 ± 0.89	1.81 ± 0.55	$0.88 \pm 0.23$ $2.44 \pm 0.42$
	Inclusve	$27.65 \pm 1.94$	$5.65 \pm 0.73$	0.63 ± 0.21	$0.71 \pm 0.27$
	1 lepton	$0.65 \pm 0.36$	3.05 ± 0.75	0.63 ± 0.21	$0.71 \pm 0.27$ $0.27 \pm 0.21$
	1 lepton from W	$0.65 \pm 0.36$	_	_	0.27 ± 0.21
$tar{t}$		0.65 ± 0.36	_	_	0.27 ± 0.21
	1 lepton, from t	$0.65 \pm 0.36$	5.65 ± 0.73	$0.63 \pm 0.21$	$0.27 \pm 0.21$
	≥ 2 leptons	26.99 ± 1.90	5.65 ± 0.73	0.63 ± 0.21	$0.44 \pm 0.17$
	$Z \rightarrow \nu \nu$		_	_	
	Inclusve	$0.32 \pm 0.32$	_	_	$0.20 \pm 0.20$
	1 lepton	$0.32 \pm 0.32$	_	_	$0.20 \pm 0.20$
$t\bar{t}$ , single lepFromT, madgraph pythia8	1 lepton, from W	<del>-</del>	_	_	
7	1 lepton, from t	$0.32 \pm 0.32$	_	_	$0.20 \pm 0.20$
	≥ 2 leptons	<del></del>	_	_	_
	$Z \rightarrow \nu \nu$		_	_	
	Inclusve	$0.33 \pm 0.16$	_	_	$0.07 \pm 0.07$
	1 lepton	$0.33 \pm 0.16$	_	_	$0.07 \pm 0.07$
$t\bar{t}$ , single lepFromTbar, madgraph pythia8, ext1	1 lepton, from W	<del>-</del>	_	_	_
tt, single lepitomi bar, madgraphi pytinas, exti	1 lepton, from t	$0.33 \pm 0.16$	_	_	$0.07 \pm 0.07$
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$		_	_	_
	Inclusve	$26.99 \pm 1.90$	$5.65 \pm 0.73$	$0.63 \pm 0.21$	$0.44 \pm 0.17$
	1 lepton	_	_	_	_
$t\bar{t}$ , diLepton, madgraph pythia8, ext1	1 lepton, from W	_	_	_	_
to, different, madgraph pythiae, extr	1 lepton, from $t$	_	_	_	_
	≥ 2 leptons	$26.99 \pm 1.90$	$5.65 \pm 0.73$	$0.63 \pm 0.21$	$0.44 \pm 0.17$
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	$1.08 \pm 1.08$	_	_	_
	1 lepton	<del>_</del>	_	_	_
single t	1 lepton, from W	<del>_</del>	_	_	_
single t	1 lepton, from $t$	<del>_</del>	_	_	_
	≥ 2 leptons	$1.08 \pm 1.08$	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	$1.08 \pm 1.08$	_	_	_
	1 lepton	_	_	_	_
. 1 / / 117 1	1 lepton, from W	_	_	_	_
single $t$ $t$ – $W$ -channel	1 lepton, from t	_	_	_	-
	≥ 2 leptons	$1.08 \pm 1.08$	_	_	-
	$Z \rightarrow \nu \nu$	_	_	_	-
	Inclusve	_	_	_	_
	1 lepton	_	l —	_	_
. 1	1 lepton, from W	_	I —	_	_
single $t$ , $t-W$ -channel, powheg pythia8	1 lepton, from t	_	_	_	_
	> 2 leptons	_	_	_	_
		_	_	_	_
	$Z \rightarrow \nu \nu$				
	$Z \rightarrow \nu \nu$ Inclusve	$1.08 \pm 1.08$	_	_	_
	Inclusve	1.08 ± 1.08		_	
	Inclusve 1 lepton	1.08 ± 1.08 —		_ _ _	 
single $\bar{t},\ t-W$ -channel, powheg pythia8	Inclusve 1 lepton 1 lepton, from W	1.08 ± 1.08 — —	_ _ _		
single $\bar{t},\ t-W$ -channel, powheg pythia8	Inclusve 1 lepton 1 lepton, from $W$ 1 lepton, from $t$	_ _ _	= = =		
single $ar{t},\ t-W$ -channel, powheg pythia8	$\begin{array}{c} \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \end{array}$	1.08 ± 1.08 ————————————————————————————————————			
single $ar{t},\ t-W$ -channel, powheg pythia8	Inclusve 1 lepton 1 lepton, from $W$ 1 lepton, from $t \geq 2$ leptons $Z \rightarrow \nu\nu$	_ _ _	- - - - -	— — — — —	
single $ar{t},\ t-W$ -channel, powheg pythia8	Inclusve 1 lepton 1 lepton, from $W$ 1 lepton, from $t \geq 2$ leptons $Z \rightarrow \nu \nu$ Inclusve	_ _ _	——————————————————————————————————————		- - - - - -
	$ \begin{array}{c} \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \text{Inclusve} \\ 1 \text{ lepton} \end{array} $	_ _ _		- - - - - - - - -	— — — — —
single $ar{t},\ t-W$ -channel, powheg pythia 8 $\label{eq:total_total}$ single $t$ non t-W-channel	$ \begin{array}{c} \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \hline \text{Inclusve} \\ 1 \text{ lepton, from } W \\ \end{array} $	_ _ _		- - - - - - - - -	— — — — — —
	Inclusve 1 lepton 1 lepton, from $W$ 1 lepton, from $t$ 2 leptons $Z \to \nu \nu$ Inclusve 1 lepton 1 lepton, from $W$ 1 lepton, from $t$	_ _ _	     	     	— — — — — —
	$ \begin{array}{c} \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \hline \text{Inclusve} \\ 1 \text{ lepton, from } W \\ \end{array} $	_ _ _		     	— — — — — —

Table 6 - continued from previous page

	Table 6 – contir	nued from previous pa			
		3jets	3jets	3jets	3jets
Sample	Classification	MT2W≥200	MT2W≥200	$MT2W \ge 200$	$MT2W \ge 200$
		250 < MET < 350	350 < MET < 450	450 < MET < 550	MET > 550
	Inclusve	_	_	_	_
	1 lepton	_	_	<u> </u>	_
	1 lepton, from W	_	_	<u> </u>	_
single $t$ , s-channel, amenlo pythia8	1 lepton, from t	_	_	<u> </u>	_
	> 2 leptons	_	_	<u> </u>	_
	$Z \rightarrow \nu \nu$	_	_	<u> </u>	_
	Inclusve	$89.66 \pm 7.24$	$35.39 \pm 4.15$	$11.02 \pm 1.98$	$8.63 \pm 1.56$
	1 lepton	$89.66 \pm 7.24$	$35.39 \pm 4.15$	$11.02 \pm 1.98$	$8.63 \pm 1.56$
	1 lepton, from W	$89.66 \pm 7.24$	$35.39 \pm 4.15$	$11.02 \pm 1.98$	$8.63 \pm 1.56$
$V+{ m Jets}$	1 lepton, from t				
	> 2 leptons	_	_	<u> </u>	_
	$Z \rightarrow \nu \nu$	_	_	<u> </u>	_
	Inclusve	_	_	_	_
	1 lepton	_	_	<u> </u>	_
	1 lepton, from W	_	_	<u> </u>	_
$DY+Jets \rightarrow \ell\ell$	1 lepton, from t	_	_	_	_
	> 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	_	_	_	_
	1 lepton	_	_	_	_
DIVITAL AND INC. TO THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OW	1 lepton, from W	_	_	_	_
$DY+Jets \rightarrow \ell\ell$ , M10to50, amenlo pythia8	1 lepton, from t	_	_	_	_
	> 2 leptons	_	_	<u> </u>	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	_	_	_	
	1 lepton	_	_	<u> </u>	_
D3711.7	1 lepton, from W	_	_	<u> </u>	_
DY+Jets $\rightarrow \ell\ell$ , M50, amenlo pythia8	1 lepton, from t	_	_	<u> </u>	_
	> 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	$89.66 \pm 7.24$	$35.39 \pm 4.15$	$11.02 \pm 1.98$	$8.63 \pm 1.56$
	1 lepton	$89.66 \pm 7.24$	$35.39 \pm 4.15$	$11.02 \pm 1.98$	$8.63 \pm 1.56$
****	1 lepton, from W	$89.66 \pm 7.24$	$35.39 \pm 4.15$	$11.02 \pm 1.98$	$8.63 \pm 1.56$
W+Jets $\rightarrow \ell \nu$	1 lepton, from t	_	_	_	_
	> 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	$6.76 \pm 3.02$	$2.22 \pm 1.57$	$1.02 \pm 1.02$	$1.60 \pm 1.13$
	1 lepton	$6.76 \pm 3.02$	$2.22 \pm 1.57$	$1.02 \pm 1.02$	$1.60 \pm 1.13$
W+Jets $\rightarrow \ell \nu$ , 100 < HT < 200, madgraph pythia8	1 lepton, from W	$6.76 \pm 3.02$	$2.22 \pm 1.57$	$1.02 \pm 1.02$	$1.60 \pm 1.13$
$W+Jets \rightarrow \ell \nu$ , $100 < HI < 200$ , madgraph pytmas	1 lepton, from $t$	_	_	_	_
	$\geq 2$ leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	$40.36 \pm 5.01$	$8.45 \pm 2.11$	$2.33 \pm 1.04$	$0.77 \pm 0.54$
	1 lepton	$40.36 \pm 5.01$	$8.45 \pm 2.11$	$2.33 \pm 1.04$	$0.77 \pm 0.54$
W+Jets $\rightarrow \ell \nu$ , 200 < HT < 400, madgraph pythia8	1 lepton, from $W$	$40.36 \pm 5.01$	$8.45 \pm 2.11$	$2.33 \pm 1.04$	$0.77 \pm 0.54$
** + 5005 - 60, 200 \ 111 \ 400, maugraph pythias	1 lepton, from $t$	_	_	_	_
	$\geq 2$ leptons	_	-	<u> </u>	_
	Z  ightarrow  u  u			<u> </u>	
	Inclusve	$25.77 \pm 4.13$	$16.45 \pm 3.13$	$3.02 \pm 1.23$	$1.62 \pm 0.81$
	1 lepton	$25.77 \pm 4.13$	$16.45 \pm 3.13$	$3.02 \pm 1.23$	$1.62 \pm 0.81$
W+Jets $\rightarrow \ell \nu$ , 400 < HT < 600, madgraph pythia8	1 lepton, from W	$25.77 \pm 4.13$	$16.45 \pm 3.13$	$3.02 \pm 1.23$	$1.62 \pm 0.81$
w +Jets→ tv, 400 < n1 < 000, madgraph pythia8	1 lepton, from $t$	_	_	_	_
	$\geq 2$ leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	<u> </u>		<u> </u>	
	Inclusve	$9.50 \pm 0.90$	$5.32 \pm 0.62$	$2.43 \pm 0.40$	$1.69 \pm 0.30$
	1 lepton	$9.50 \pm 0.90$	$5.32 \pm 0.62$	$2.43 \pm 0.40$	$1.69 \pm 0.30$
W+Jets $\rightarrow \ell \nu$ , 600 < $HT$ < 800, madgraph pythia8	1 lepton, from $W$	$9.50 \pm 0.90$	$5.32 \pm 0.62$	$2.43 \pm 0.40$	$1.69 \pm 0.30$
** + 5005 - 60, 000 \ 111 \ 000, maugraph pythias	1 lepton, from $t$	_	-	<u> </u>	_
	$\geq 2$ leptons	_	-	_	-
	$Z \rightarrow \nu \nu$			<u> </u>	
				Continue	d on next page

Table 6 - continued from previous page

	Table 6 – conti	nued from previous pa	age		
		3jets	3jets	3jets	3jets
Sample	Classification	$MT2W \ge 200$	MT2W≥200	MT2W≥200	$MT2W \ge 200$
		250 < MET < 350	350 < MET < 450	450 < MET < 550	MET > 550
	Inclusve	$4.89 \pm 0.33$	$2.26 \pm 0.21$	$1.51 \pm 0.16$	$2.06 \pm 0.17$
	1 lepton	$4.89 \pm 0.33$	2.26 ± 0.21	$1.51 \pm 0.16$	$2.06 \pm 0.17$
	1 lepton, from W	$4.89 \pm 0.33$	$2.26 \pm 0.21$	$1.51 \pm 0.16$	$2.06 \pm 0.17$
W+Jets $\rightarrow \ell \nu$ , 800 $<$ $HT$ $<$ 1200, madgraph pythia8	1 lepton, from t	=			
	> 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	$2.27 \pm 0.54$	$0.63 \pm 0.26$	$0.68 \pm 0.26$	$0.85 \pm 0.26$
	1 lepton	$2.27 \pm 0.54$	0.63 ± 0.26	0.68 ± 0.26	$0.85 \pm 0.26$
	1 lepton, from W	$2.27 \pm 0.54$	0.63 ± 0.26	$0.68 \pm 0.26$	$0.85 \pm 0.26$
W+Jets $\rightarrow \ell \nu$ , 1200 $<$ $HT$ $<$ 2500, madgraph pythia8	1 lepton, from t				
	> 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	$0.12 \pm 0.02$	$0.05 \pm 0.01$	$0.03 \pm 0.01$	$0.03 \pm 0.01$
	1 lepton	$0.12 \pm 0.02$ $0.12 \pm 0.02$	0.05 ± 0.01	$0.03 \pm 0.01$	$0.03 \pm 0.01$ $0.03 \pm 0.01$
	1 lepton, from W	$0.12 \pm 0.02$ $0.12 \pm 0.02$	0.05 ± 0.01	$0.03 \pm 0.01$	$0.03 \pm 0.01$ $0.03 \pm 0.01$
W+Jets $\rightarrow \ell \nu$ , 2500 $< HT < Inf$ , madgraph pythia8	1 lepton, from t	0.12 ± 0.02	0.00 ± 0.01	0.05 ± 0.01	0.00 ± 0.01
	> 2 leptons				_
	$Z \rightarrow \nu \nu$				_
-	Inclusve	$29.77 \pm 2.17$	14.91 ± 1.81	2.96 ± 0.80	$3.77 \pm 0.70$
	1 lepton	$3.75 \pm 1.16$	$4.68 \pm 1.48$	$0.70 \pm 0.54$	$0.89 \pm 0.54$
	1 lepton from W	$3.75 \pm 1.16$ $3.75 \pm 1.16$	4.68 ± 1.48	$0.70 \pm 0.54$ $0.70 \pm 0.54$	$0.89 \pm 0.54$ $0.89 \pm 0.54$
Rare	1 lepton, from t	$0.00 \pm 0.00$	$0.00 \pm 0.00$	0.70 ± 0.34 0.00 ± 0.00	0.09 ± 0.04
	> 2 leptons	$7.89 \pm 1.03$	$2.46 \pm 0.54$	$0.46 \pm 0.21$	0.44 + 0.18
	$Z \rightarrow \nu \nu$	$18.13 \pm 1.51$	7.77 ± 0.89	$1.81 \pm 0.55$	$2.44 \pm 0.18$ $2.44 \pm 0.42$
	Inclusve	$27.69 \pm 2.16$	14.36 ± 1.81	2.75 ± 0.80	$3.68 \pm 0.70$
	1 lepton	$3.75 \pm 1.16$	4.68 ± 1.48	$0.70 \pm 0.54$	$0.89 \pm 0.70$
	1 lepton, from W	$3.75 \pm 1.16$ $3.75 \pm 1.16$	4.68 ± 1.48	$0.70 \pm 0.54$ $0.70 \pm 0.54$	
diBoson	1 lepton, from t	3.75 ± 1.16	4.08 ± 1.48	0.70 ± 0.54	$0.89 \pm 0.54$
	> 2 leptons	$7.38 \pm 1.01$	$2.43 \pm 0.53$	$0.41 \pm 0.21$	$0.44 \pm 0.18$
	$Z \rightarrow \nu \nu$	$16.56 \pm 1.01$ 16.56 + 1.51	7.26 + 0.89	$0.41 \pm 0.21$ $1.64 \pm 0.55$	$0.44 \pm 0.18$ $2.35 \pm 0.42$
		9.20 ± 1.51	6.55 ± 1.57	0.95 ± 0.57	$1.10 \pm 0.56$
	Inclusve	$9.20 \pm 1.51$ $2.27 \pm 1.14$			
	1 lepton 1 lepton, from W	$2.27 \pm 1.14$ $2.27 \pm 1.14$	$4.17 \pm 1.48$ $4.17 \pm 1.48$	$0.54 \pm 0.54$ $0.54 \pm 0.54$	$0.75 \pm 0.53$ $0.75 \pm 0.53$
WW	1 lepton, from t	2.27 ± 1.14	4.17 ± 1.48	0.54 ± 0.54	0.75 ± 0.55
	> 2 leptons			0.41 ± 0.21	
	$Z \rightarrow \nu \nu$	$6.93 \pm 1.00$	$2.38 \pm 0.53$	$0.41 \pm 0.21$	$0.35 \pm 0.17$
	Inclusve	6.93 ± 1.00	2.38 ± 0.53	$0.41 \pm 0.21$	$0.35 \pm 0.17$
	1 lepton	6.93 ± 1.00	2.36 ± 0.33	0.41 ± 0.21	0.35 ± 0.17
		<del>-</del>	_	<del>-</del>	_
$WW \rightarrow 2\ell 2\nu$ , powheg	1 lepton, from W 1 lepton, from t	_	_	_	_
	> 2 leptons	6.93 ± 1.00	2 28 ± 0 52	$0.41 \pm 0.21$	$0.35 \pm 0.17$
	$Z \rightarrow \nu \nu$	0.93 ± 1.00	$2.38 \pm 0.53$	0.41 ± 0.21	0.30 ± 0.17
	$Z \rightarrow \nu \nu$ Inclusve	$\frac{-}{2.27 \pm 1.14}$	4 17 1 1 49	$-$ 0.54 $\pm$ 0.54	$-$ 0.75 $\pm$ 0.53
	1 lepton	$\begin{array}{c} 2.27 \pm 1.14 \\ 2.27 \pm 1.14 \end{array}$	$4.17 \pm 1.48$ $4.17 \pm 1.48$	$0.54 \pm 0.54$ $0.54 \pm 0.54$	$0.75 \pm 0.53$ $0.75 \pm 0.53$
	1 lepton 1 lepton, from W	$2.27 \pm 1.14$ $2.27 \pm 1.14$	$4.17 \pm 1.48$ $4.17 \pm 1.48$	$0.54 \pm 0.54$ $0.54 \pm 0.54$	$0.75 \pm 0.53$ $0.75 \pm 0.53$
$WW \rightarrow \ell \nu qq$ , powheg	1 lepton, from w	2.21 ± 1.14	4.17 ± 1.40	0.54 ± 0.54	0.70 ± 0.53
	> 2 leptons			_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
		17.00 ± 1.54	7.62 ± 0.00	171 + 0 55	2 52 ± 0.42
	Inclusve	$17.99 \pm 1.54$	$7.62 \pm 0.90$	$1.71 \pm 0.55$	$2.53 \pm 0.43$
	1 lepton	$1.48 \pm 0.26$	0.51 ± 0.15	0.16 ± 0.08	$0.14 \pm 0.06$
WZ	1 lepton, from W	$1.48 \pm 0.26$	$0.51 \pm 0.15$	$0.16 \pm 0.08$	$0.14 \pm 0.06$
	1 lepton, from t	$0.43 \pm 0.15$	0.04 + 0.05	_	0.10 ± 0.00
	≥ 2 leptons		$0.04 \pm 0.05$	1 55 1 0 55	$0.10 \pm 0.06$
	$Z \rightarrow \nu \nu$	16.09 ± 1.51	7.07 ± 0.89	$1.55 \pm 0.55$	$2.29 \pm 0.42$
	Inclusve	$0.38 \pm 0.15$	$0.04 \pm 0.04$	_	$0.10 \pm 0.06$
	1 lepton	_	_	_	_
$WZ\rightarrow 3\ell\nu$ , powheg pythia8	1 lepton, from W	_	_	_	_
	1 lepton, from t	0.28 ± 0.15	0.04 ± 0.04		0.10 ± 0.00
	≥ 2 leptons	$0.38 \pm 0.15$	$0.04 \pm 0.04$	_	$0.10 \pm 0.06$
	$Z \rightarrow \nu \nu$	_	_		
				Continue	d on next page

Table 6 - continued from previous page

	Table 6 – conti	nued from previous pa			
		3jets	3jets	3jets	3jets
Sample	Classification	MT2W≥200	$MT2W \ge 200$	MT2W≥200	$MT2W \ge 200$
		250 < MET < 350	350 < MET < 450	450 < MET < 550	MET > 550
	Inclusve	$0.04 \pm 0.04$	_	_	_
	1 lepton		_	<u> </u>	_
77.7 a.40.0	1 lepton, from W	_	_	<u> </u>	_
$WZ\rightarrow 2\ell 2Q$ , amcnlo pythia8	1 lepton, from t	_	_	<u> </u>	_
	> 2 leptons	$0.04 \pm 0.04$	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	$1.48 \pm 0.26$	$0.51 \pm 0.15$	$0.16 \pm 0.08$	$0.14 \pm 0.06$
	1 lepton	$1.48 \pm 0.26$	$0.51 \pm 0.15$	$0.16 \pm 0.08$	$0.14 \pm 0.06$
	1 lepton, from W	$1.48 \pm 0.26$	$0.51 \pm 0.15$	$0.16 \pm 0.08$	$0.14 \pm 0.06$
$WZ \rightarrow \ell \nu 2Q$ , amcnlo pythia8	1 lepton, from t				
	> 2 leptons	_		_	_
	$Z \rightarrow \nu \nu$	_		_	_
	Inclusve	$16.09 \pm 1.51$	$7.07 \pm 0.89$	$1.55 \pm 0.55$	$2.29 \pm 0.42$
	1 lepton	I			
W7 440 1 11 0	1 lepton, from W	_		<u> </u>	_
$WZ\rightarrow 1\ell 3\nu$ , amcnlo pythia8	1 lepton, from t	_		_	_
	≥ 2 leptons	_		_	_
	$Z \rightarrow \nu \nu$	$16.09 \pm 1.51$	$7.07 \pm 0.89$	$1.55 \pm 0.55$	$2.29 \pm 0.42$
	Inclusve	$0.50 \pm 0.04$	$0.19 \pm 0.02$	$0.10 \pm 0.01$	$0.05 \pm 0.01$
	1 lepton	_	_	_	
7.7	1 lepton, from W	_	_	_	_
ZZ	1 lepton, from t	_		_	_
	> 2 leptons	$0.03 \pm 0.02$	$0.00 \pm 0.01$	_	_
	$Z \rightarrow \nu \nu$	$0.47 \pm 0.03$	$0.19 \pm 0.02$	$0.10 \pm 0.01$	$0.05 \pm 0.01$
	Inclusve	$0.03 \pm 0.02$	$0.00 \pm 0.01$	_	_
	1 lepton	_	_	_	_
77 . 2/201	1 lepton, from W	_	_	_	_
$ZZ \rightarrow 2\ell 2Q$ , amenlo pythia8	1 lepton, from t	_	_	_	_
	≥ 2 leptons	$0.03 \pm 0.02$	$0.00 \pm 0.01$	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	$0.44 \pm 0.03$	$0.17 \pm 0.01$	$0.08 \pm 0.01$	$0.05 \pm 0.01$
	1 lepton	_	_	_	_
$ZZ\rightarrow 2\ell 2\nu$ , powheg pythia8	1 lepton, from W	_	_	_	_
ZZ→ZtZv, powneg pytmas	1 lepton, from $t$	_		<u> </u>	_
	$\geq$ 2 leptons	<del>-</del>	-	<del>-</del>	<del>-</del>
	$Z \rightarrow \nu \nu$	$0.44 \pm 0.03$	$0.17 \pm 0.01$	$0.08 \pm 0.01$	$0.05 \pm 0.01$
	Inclusve	$0.03 \pm 0.02$	$0.01 \pm 0.01$	$0.02 \pm 0.01$	_
	1 lepton	_	_	_	_
$ZZ\rightarrow 2Q2\nu$ , amenlo pythia8	1 lepton, from W	_		_	_
22 .2 22, amento pytinao	1 lepton, from t	_		_	_
	$\geq 2$ leptons	l <del>.</del>	<del>-</del>	l <del>-</del>	_
	$Z \rightarrow \nu \nu$	$0.03 \pm 0.02$	$0.01 \pm 0.01$	$0.02 \pm 0.01$	
	Inclusve	$2.08 \pm 0.18$	$0.55 \pm 0.07$	$0.21 \pm 0.06$	$0.09 \pm 0.01$
	1 lepton	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	_
$tar{t}+V$	1 lepton, from W	l <del>.</del>	<del>-</del>	l <del>-</del>	_
== 1 · t	1 lepton, from t	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	_
	≥ 2 leptons	$0.51 \pm 0.17$	$0.03 \pm 0.07$	$0.05 \pm 0.05$	
	$Z \rightarrow \nu \nu$	$1.57 \pm 0.04$	$0.51 \pm 0.02$	$0.16 \pm 0.01$	$0.09 \pm 0.01$
	Inclusve	$0.49 \pm 0.17$	$0.03 \pm 0.07$	$0.04 \pm 0.05$	_
	1 lepton	_	_	_	_
$t\bar{t}+W$	1 lepton, from W	_	_	_	_
	1 lepton, from t	l <del></del>		l <del>.</del>	_
	≥ 2 leptons	$0.49 \pm 0.17$	$0.03 \pm 0.07$	$0.04 \pm 0.05$	_
	$Z \rightarrow \nu \nu$				
	Inclusve	$0.39 \pm 0.16$	$0.03 \pm 0.07$	$0.04 \pm 0.05$	_
	1 lepton	_		_	_
$t\bar{t} + W \rightarrow \ell\nu$ , amenlo pythia8	1 lepton, from W	_	_	_	_
	1 lepton, from t				_
	≥ 2 leptons	$0.39 \pm 0.16$	$0.03 \pm 0.07$	$0.04 \pm 0.05$	_
	$Z \rightarrow \nu \nu$	_	_		
				Continue	d on next page

Table 6 - continued from previous page

		3jets	3jets	3jets	3jets
Sample	Classification	MT2W>200	MT2W>200	MT2W>200	MT2W>200
Sample	Classification	250 < MET < 350	350 < MET < 450	450 < MET < 550	MET > 550
			350 < ME1 < 450	450 < ME1 < 550	ME1 > 330
	Inclusve	$0.10 \pm 0.05$	_	<del>-</del>	_
	1 lepton	<del></del>	_	<del>-</del>	_
$t\bar{t} + W \rightarrow QQ$ , amenlo pythia8	1 lepton, from W	<del>_</del>	_	<del>_</del>	_
tt + w → QQ, amenio pytmas	1 lepton, from $t$	<u> </u>	_	<del>_</del>	_
	$\geq$ 2 leptons	$0.10 \pm 0.05$	_	<del>_</del>	_
	$Z \rightarrow \nu \nu$	<u> </u>	_	<del>_</del>	_
	Inclusve	$1.59 \pm 0.04$	$0.52 \pm 0.02$	$0.16 \pm 0.01$	$0.09 \pm 0.01$
	1 lepton	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	_
$t\bar{t} + Z$	1 lepton, from W	<u> </u>	_	<u>—</u>	_
$\iota\iota \iota + Z$	1 lepton, from $t$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	_
	≥ 2 leptons	$0.02 \pm 0.01$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	_
	$Z \rightarrow \nu \nu$	$1.57 \pm 0.04$	$0.51 \pm 0.02$	$0.16 \pm 0.01$	$0.09 \pm 0.01$
	Inclusve	$1.59 \pm 0.04$	$0.52 \pm 0.02$	$0.16 \pm 0.01$	$0.09 \pm 0.01$
	1 lepton	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	_
(T   77 )	1 lepton, from W	_	_	_	_
$t\bar{t}+Z$ , madgraph	1 lepton, from $t$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	_
	≥ 2 leptons	$0.02 \pm 0.01$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	_
	$Z \rightarrow \nu \nu$	$1.57 \pm 0.04$	$0.51 \pm 0.02$	$0.16 \pm 0.01$	$0.09 \pm 0.01$
	Inclusve	$0.07 \pm 0.05$	_	_	
	1 lepton	_	_	_	_
$t\bar{t} + Z \rightarrow QQ$ , amenlo pythia8	1 lepton, from W	<u> </u>	_	<u> </u>	_
$tt + Z \rightarrow QQ$ , amenio pytmas	1 lepton, from t	_	_	_	_
	> 2 leptons	$0.07 \pm 0.05$	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	$1.49 \pm 0.37$	$0.42 \pm 0.17$	$0.30 \pm 0.13$	$0.17 \pm 0.07$
	1 lepton	_	_	_	_
	1 lepton, from W	<u> </u>	_	_	_
$t\bar{t} + Z \rightarrow 2\ell 2\nu$ , amcnlo pythia8	1 lepton, from t	_	_	_	_
	> 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	$1.49 \pm 0.37$	$0.42 \pm 0.17$	$0.30 \pm 0.13$	$0.17 \pm 0.07$

CR0b, Nominal Systematic, Yield Table for Input Samples

CROB, Nomin	nal Systematic, Yield T		\ 4:-t-	\ \1:=k=
Sample	Classification	≥4jets MT2W< 200	$\geq$ 4jets MT2W< 200	≥4jets MT2W< 200
oumpro .	Cidoonicación	250 < MET < 350	350 < MET < 450	MET > 450
Data, single $e/\mu$ , MET	Inclusve	87.00 ± 9.33	$20.00 \pm 4.47$	$15.00 \pm 3.87$
, , , , , ,	Inclusve	117.08 ± 5.55	$24.58 \pm 2.64$	$6.61 \pm 0.73$
	1 lepton	$35.82 \pm 4.29$	$10.71 \pm 2.20$	$1.66 \pm 0.29$
	1 lepton, from W	$32.67 \pm 4.14$	$10.62 \pm 2.20$	$1.43 \pm 0.24$
All Background	1 lepton, from t	$3.15 \pm 1.11$	$0.09 \pm 0.09$	$0.23 \pm 0.15$
	> 2 leptons	$73.52 \pm 3.40$	$12.75 \pm 1.38$	$3.86 \pm 0.60$
	$Z \rightarrow \nu \nu$	7.73 ± 0.89	$1.12 \pm 0.45$	$1.09 \pm 0.29$
	Inclusve	72.12 ± 3.29	11.60 ± 1.34	$3.55 \pm 0.58$
	1 lepton	$3.14 \pm 1.11$	$0.09 \pm 0.09$	$0.21 \pm 0.15$
$iar{t}$	1 lepton, from W	0.11 ± 1.11	- 0.00 ± 0.00	U.21 ± 0.10
	1 lepton, from t	$3.14 \pm 1.11$	$0.09 \pm 0.09$	$0.21 \pm 0.15$
	≥ 2 leptons	68.98 ± 3.10	$11.51 \pm 1.33$	$3.35 \pm 0.56$
	$Z \rightarrow \nu \nu$			
	Inclusve	2.30 ± 1.06		
	1 lepton	2.30 ± 1.06	_	_
	1 lepton, from W		_	
$t\bar{t}$ , single lepFromT, madgraph pythia8	1 lepton, from t	$2.30 \pm 1.06$	_	_
	> 2 leptons		_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$0.85 \pm 0.34$	$0.09 \pm 0.09$	$0.21 \pm 0.15$
	1 lepton	$0.85 \pm 0.34$	$0.09 \pm 0.09$	$0.21 \pm 0.15$
.=	1 lepton, from W			
$tar{t}$ , single lep FromTbar, madgraph pythia 8, ext1	1 lepton, from t	$0.85 \pm 0.34$	$0.09 \pm 0.09$	$0.21 \pm 0.15$
	≥ 2 leptons			
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$68.98 \pm 3.10$	$11.51 \pm 1.33$	$3.35 \pm 0.56$
	1 lepton	_	_	_
	1 lepton, from W	_	_	_
$t\bar{t}$ , diLepton, madgraph pythia8, ext1	1 lepton, from t	_	_	_
	≥ 2 leptons	$68.98 \pm 3.10$	$11.51 \pm 1.33$	$3.35 \pm 0.56$
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$1.24 \pm 1.24$		_
	1 lepton	_	_	_
single t	1 lepton, from W	_	_	_
single t	1 lepton, from t	_	_	_
	≥ 2 leptons	$1.24 \pm 1.24$	_	_
	$Z \rightarrow \nu \nu$	_		_
	Inclusve	$1.24 \pm 1.24$	_	_
	1 lepton	_	_	_
single $t \ t - W$ -channel	1 lepton, from W	_	_	_
***************************************	1 lepton, from t		_	_
	≥ 2 leptons	$1.24 \pm 1.24$	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	_	_	_
	1 lepton	_	_	_
single $t$ , $t - W$ -channel, powheg pythia8	1 lepton, from W		_	_
	1 lepton, from t		_	_
	≥ 2 leptons	_	_	
	$Z \rightarrow \nu \nu$	1 24 + 1 24	<u> </u>	
	Inclusve	$1.24 \pm 1.24$	_	_
	1 lepton		_	
single $\bar{t}$ , $t - W$ -channel, powheg pythia8	1 lepton, from W 1 lepton, from t		_	
3 - 1,	> 2 leptons	$1.24 \pm 1.24$	_	
	$Z \rightarrow \nu \nu$	1.24 ± 1.24		
	$Z \rightarrow \nu \nu$ Inclusve			_
			_	_
	1 lepton	_	_	_
single $t$ non $t - W$ -channel	1 lepton, from W	_	_	_
	1 lepton, from t	_	_	
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$			l

Table	7 - continued from			
		≥4jets	≥4jets	≥4jets
Sample	Classification	MT2W< 200	MT2W< 200	MT2W < 200
		250 < MET < 350	350 < MET < 450	MET > 450
	Inclusve	_	_	_
	1 lepton	_	_	_
	1 lepton, from W	_	_	_
single t, s-channel, amcnlo pythia8	1 lepton, from t	_	_	_
	> 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$30.59 \pm 4.05$	$9.96 \pm 2.14$	$1.42 \pm 0.24$
	1 lepton	$30.59 \pm 4.05$	$9.96 \pm 2.14$	$1.42 \pm 0.24$
	1 lepton, from W	30.59 ± 4.05	$9.96 \pm 2.14$	$1.42 \pm 0.24$
V + Jets	1 lepton, from t		0.00 ± 2.11	
	> 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	_		
	1 lepton	_	_	
	1 lepton, from W	_	_	
$DY+Jets \rightarrow \ell\ell$	1 lepton, from t			
	> 2 leptons			
	$Z \rightarrow \nu \nu$			
		_		_
	Inclusve	_	_	
	1 lepton	_	_	_
DY+Jets→ ℓℓ, M10to50, amenlo pythia8	1 lepton, from W		_	_
	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	
	Inclusve	_	_	_
DY+Jets $\rightarrow \ell\ell$ , M50, amc nlo pythia8	1 lepton	_	_	_
	1 lepton, from W	_	_	_
	1 lepton, from $t$	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$30.59 \pm 4.05$	$9.96 \pm 2.14$	$1.42 \pm 0.24$
	1 lepton	$30.59 \pm 4.05$	$9.96 \pm 2.14$	$1.42 \pm 0.24$
$W+Jets \rightarrow \ell  u$	1 lepton, from W	$30.59 \pm 4.05$	$9.96 \pm 2.14$	$1.42 \pm 0.24$
W+Jets→ ℓν	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$1.29 \pm 1.29$	$1.11 \pm 1.11$	_
	1 lepton	$1.29 \pm 1.29$	$1.11 \pm 1.11$	_
W.   I-t-   /- 100 < UT < 200  thi-8	1 lepton, from W	$1.29 \pm 1.29$	$1.11 \pm 1.11$	_
W+Jets $\rightarrow \ell \nu$ , 100 < HT < 200, madgraph pythia8	1 lepton, from t	-	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$11.49 \pm 2.71$	$1.59 \pm 0.92$	_
	1 lepton	$11.49 \pm 2.71$	$1.59 \pm 0.92$	_
*****	1 lepton, from W	$11.49 \pm 2.71$	$1.59 \pm 0.92$	_
W+Jets $\rightarrow \ell \nu$ , 200 < HT < 400, madgraph pythia8	1 lepton, from t		_	_
	> 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$10.08 \pm 2.61$	$3.97 \pm 1.50$	
	1 lepton	$10.08 \pm 2.61$	$3.97 \pm 1.50$ $3.97 \pm 1.50$	
	1 lepton, from W	10.08 ± 2.61	$3.97 \pm 1.50$ $3.97 \pm 1.50$	
W+Jets $\rightarrow \ell \nu$ , 400 < $HT$ < 600, madgraph pythia8	1 lepton, from t	10.00 ± 2.01	3.37 ± 1.00	_
**	> 2 leptons	_	_	_
			_	_
	$Z \rightarrow uu$			
	$Z \rightarrow \nu \nu$	4 20 1 0 60	2.07 ± 0.20	0.63 ± 0.10
	Inclusve	4.20 ± 0.60	$2.07 \pm 0.39$	$0.63 \pm 0.19$
	Inclusve 1 lepton	$4.20 \pm 0.60$	$2.07 \pm 0.39$	$0.63 \pm 0.19$
W+Jets $\rightarrow \ell \nu$ , 600 < $HT$ < 800, madgraph pythia8	Inclusve 1 lepton 1 lepton, from W	$4.20 \pm 0.60$ $4.20 \pm 0.60$	$2.07 \pm 0.39$ $2.07 \pm 0.39$	
W+Jets — $\ell\nu,600 < HT < 800,{\rm madgraph~pythia8}$	Inclusve $1 \text{ lepton}$ $1 \text{ lepton, from } W$ $1 \text{ lepton, from } t$	$\begin{array}{c} 4.20  \pm  0.60 \\ 4.20  \pm  0.60 \\ \end{array}$	$2.07 \pm 0.39$ $2.07 \pm 0.39$ —	$0.63 \pm 0.19 \\ 0.63 \pm 0.19$
W+Jets $\rightarrow \ell \nu,  600 < HT < 800,  { m madgraph  pythia8}$	Inclusve 1 lepton 1 lepton, from W	$4.20 \pm 0.60$ $4.20 \pm 0.60$	$2.07 \pm 0.39$ $2.07 \pm 0.39$	$0.63 \pm 0.19$

Table	7 – continued from			
		≥4jets	≥4jets	≥4jets
Sample	Classification	MT2W < 200	MT2W < 200	MT2W < 200
		250 < MET < 350	350 < MET < 450	MET > 450
	Inclusve	$2.47 \pm 0.23$	$0.71 \pm 0.12$	$0.61 \pm 0.10$
	1 lepton	$2.47 \pm 0.23$	$0.71 \pm 0.12$	$0.61 \pm 0.10$
	1 lepton, from W	$2.47 \pm 0.23$	$0.71 \pm 0.12$	$0.61 \pm 0.10$
W+Jets $\rightarrow \ell \nu$ , 800 $< HT < 1200$ , madgraph pythia8	1 lepton, from t			
	> 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$1.03 \pm 0.37$	$0.50 \pm 0.25$	$0.17 \pm 0.12$
	1 lepton	$1.03 \pm 0.37$	$0.50 \pm 0.25$	$0.17 \pm 0.12$
W. T	1 lepton, from W	$1.03 \pm 0.37$	$0.50 \pm 0.25$	$0.17 \pm 0.12$
W+Jets $\rightarrow \ell \nu$ , 1200 $< HT < 2500$ , madgraph pythia8	1 lepton, from t	_	_	_
	> 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$0.03 \pm 0.01$	$0.01 \pm 0.01$	$0.01 \pm 0.00$
	1 lepton	$0.03 \pm 0.01$	$0.01 \pm 0.01$	$0.01 \pm 0.00$
THE TAX OF SECURITY SECTION 1. 1. 11'S	1 lepton, from W	$0.03 \pm 0.01$	$0.01 \pm 0.01$	$0.01 \pm 0.00$
W+Jets $\rightarrow \ell \nu$ , 2500 $< HT < Inf$ , madgraph pythia8	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	<u> </u>	<u> </u>	
	Inclusve	$13.13 \pm 1.41$	$3.02 \pm 0.78$	$1.64 \pm 0.36$
	1 lepton	$2.09 \pm 0.86$	$0.66 \pm 0.53$	$0.03 \pm 0.03$
Rare	1 lepton, from W	$2.08 \pm 0.86$	$0.66 \pm 0.53$	$0.01 \pm 0.02$
nare	1 lepton, from $t$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	$0.02 \pm 0.02$
	≥ 2 leptons	$3.31 \pm 0.67$	$1.24 \pm 0.36$	$0.51 \pm 0.22$
	$Z \rightarrow \nu \nu$	$7.73 \pm 0.89$	$1.12 \pm 0.45$	$1.09 \pm 0.29$
	Inclusve	$10.96 \pm 1.39$	$2.49 \pm 0.78$	$1.49 \pm 0.36$
	1 lepton	$2.05 \pm 0.86$	$0.66 \pm 0.53$	$0.01 \pm 0.02$
diBoson	1 lepton, from W	$2.05 \pm 0.86$	$0.66 \pm 0.53$	$0.01 \pm 0.02$
di Boson	1 lepton, from t	<del>-</del>	<del>-</del>	_
	≥ 2 leptons	$3.09 \pm 0.64$	$1.11 \pm 0.35$	$0.47 \pm 0.21$
	$Z \rightarrow \nu \nu$	$5.82 \pm 0.89$	$0.73 \pm 0.45$	$1.01 \pm 0.29$
	Inclusve	$3.96 \pm 1.05$	$1.47 \pm 0.62$	$0.47 \pm 0.21$
	1 lepton	$1.19 \pm 0.84$	$0.52 \pm 0.52$	_
WW	1 lepton, from W	$1.19 \pm 0.84$	$0.52 \pm 0.52$	_
	1 lepton, from t			0.47   0.01
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	$2.77 \pm 0.62$	$0.95 \pm 0.34$	$0.47 \pm 0.21$
	Inclusve	$2.77 \pm 0.62$	0.95 ± 0.34	$0.47 \pm 0.21$
	1 lepton	2.77 ± 0.02	0.93 ± 0.34	0.47 ± 0.21
	1 lepton, from W			
$WW \rightarrow 2\ell 2\nu$ , powheg	1 lepton, from t			_
	> 2 leptons	$2.77 \pm 0.62$	$0.95 \pm 0.34$	$0.47 \pm 0.21$
	$Z \rightarrow \nu \nu$			
	Inclusve	$1.19 \pm 0.84$	$0.52 \pm 0.52$	_
	1 lepton	$1.19 \pm 0.84$	$0.52 \pm 0.52$	_
	1 lepton, from W	$1.19 \pm 0.84$	$0.52 \pm 0.52$	_
$WW \rightarrow \ell \nu qq$ , powheg	1 lepton, from t		= -	_
	> 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$		_	_
	Inclusve	$6.83 \pm 0.91$	$0.99 \pm 0.46$	$1.01 \pm 0.29$
	1 lepton	$0.86 \pm 0.18$	$0.13 \pm 0.08$	$0.01 \pm 0.02$
WZ	1 lepton, from W	$0.86 \pm 0.18$	$0.13 \pm 0.08$	$0.01 \pm 0.02$
VV ZJ	1 lepton, from t		_	_
	≥ 2 leptons	$0.31 \pm 0.13$	$0.15 \pm 0.09$	_
	$Z \rightarrow \nu \nu$	$5.65 \pm 0.89$	$0.70 \pm 0.45$	$0.99 \pm 0.29$
	Inclusve	$0.31 \pm 0.13$	$0.15 \pm 0.09$	_
	1 lepton	_	_	_
$WZ \rightarrow 3\ell\nu$ , powheg pythia8	1 lepton, from W	_	_	_
=, rounds pjundo	1 lepton, from t	· -	<del>-</del>	_
	≥ 2 leptons	$0.31 \pm 0.13$	$0.15 \pm 0.09$	_
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	0.31 ± 0.13 —		ed on next page

	Table 7 – continued from			
		≥4jets	≥4jets	≥4jets
Sample	Classification	MT2W< 200	MT2W< 200	MT2W< 200
		250 < MET < 350	350 < MET < 450	MET > 450
	Inclusve	$0.01 \pm 0.02$	_	_
	1 lepton	_	_	_
$WZ\rightarrow 2\ell 2Q$ , amcnlo pythia8	1 lepton, from W	_	_	_
$WZ \rightarrow 2\ell 2Q$ , amenio pytinas	1 lepton, from t	_	_	_
	≥ 2 leptons	$0.01 \pm 0.02$	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$0.86 \pm 0.18$	$0.13 \pm 0.08$	$0.01 \pm 0.02$
	1 lepton	$0.86 \pm 0.18$	$0.13 \pm 0.08$	$0.01 \pm 0.02$
$WZ \rightarrow \ell \nu 2Q$ , amenlo pythia8	1 lepton, from W	$0.86 \pm 0.18$	$0.13 \pm 0.08$	$0.01 \pm 0.02$
ν 2 – εν 2 Q., anicino pytinas	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_		
	Inclusve	$5.65 \pm 0.89$	$0.70 \pm 0.45$	$0.99 \pm 0.29$
	1 lepton	_	_	_
$WZ \rightarrow 1\ell 3\nu$ , amenlo pythia8	1 lepton, from W	_	_	_
1.	1 lepton, from t	_	_	_
	≥ 2 leptons		0.50 1.045	
	$Z \rightarrow \nu \nu$ Inclusve	$5.65 \pm 0.89$	$0.70 \pm 0.45$	0.99 ± 0.29
		$0.17 \pm 0.03$	$0.03 \pm 0.01$	$0.01 \pm 0.00$
	1 lepton 1 lepton, from W	_	_	_
ZZ	1 lepton, from t	_	_	
	> 2 leptons	$0.00 \pm 0.02$	0.01 ± 0.01	
	$Z \rightarrow \nu \nu$	$0.00 \pm 0.02$ $0.17 \pm 0.02$	$0.01 \pm 0.01$ $0.03 \pm 0.01$	$0.01 \pm 0.00$
	Inclusve	0.00 ± 0.02	0.01 ± 0.01	0.01 ± 0.00
	1 lepton	0.00 ± 0.02	0.01 ± 0.01	
	1 lepton, from W			_
$ZZ\rightarrow 2\ell 2Q$ , amcnlo pythia8	1 lepton, from t	_		_
	> 2 leptons	$0.00 \pm 0.02$	$0.01 \pm 0.01$	_
	$Z \rightarrow \nu \nu$			_
	Inclusve	$0.16 \pm 0.02$	$0.03 \pm 0.01$	$0.01 \pm 0.00$
	1 lepton			
	1 lepton, from W	_		_
$ZZ\rightarrow 2\ell 2\nu$ , powheg pythia8	1 lepton, from t	_	_	_
	> 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	$0.16 \pm 0.02$	$0.03 \pm 0.01$	$0.01 \pm 0.00$
	Inclusve	$0.00 \pm 0.01$	_	_
	1 lepton	_	_	_
$ZZ\rightarrow 2Q2\nu$ , amcnlo pythia8	1 lepton, from W	_	_	_
ZZ→ZQZV, amenio pytmas	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	$0.00 \pm 0.01$	_	_
	Inclusve	$2.17 \pm 0.23$	$0.53 \pm 0.10$	$0.15 \pm 0.06$
	1 lepton	$0.04 \pm 0.03$	$0.00 \pm 0.00$	$0.02 \pm 0.02$
$t\bar{t} + V$	1 lepton, from W	$0.03 \pm 0.03$	<del>-</del>	_
77 I 7	1 lepton, from t	$0.01 \pm 0.00$	$0.00 \pm 0.00$	$0.02 \pm 0.02$
	≥ 2 leptons	$0.22 \pm 0.22$	$0.13 \pm 0.09$	$0.04 \pm 0.06$
	$Z \rightarrow \nu \nu$	$1.91 \pm 0.05$	$0.39 \pm 0.02$	$0.09 \pm 0.01$
	Inclusve	0.22 ± 0.23	$0.13 \pm 0.09$	$0.06 \pm 0.06$
	1 lepton	$0.03 \pm 0.03$	_	$0.02 \pm 0.02$
$t\bar{t}+W$	1 lepton, from W	$0.03 \pm 0.03$	_	
•	1 lepton, from t			$0.02 \pm 0.02$
	≥ 2 leptons	$0.19 \pm 0.22$	$0.13 \pm 0.09$	$0.04 \pm 0.06$
	$Z \rightarrow \nu \nu$	0.00   0.10		
	Inclusve	0.03 ± 0.19	$0.06 \pm 0.08$	$0.02 \pm 0.04$
	1  lepton $1  lepton, from  W$	$0.03 \pm 0.03$ $0.03 \pm 0.03$	<del>-</del>	_
$t\bar{t} + W \rightarrow \ell\nu$ , amenlo pythia8	1 lepton, from W	0.03 ± 0.03	_	
	$\geq 2$ leptons		$0.06 \pm 0.08$	$0.02 \pm 0.04$
	$Z \rightarrow \nu \nu$		0.00 ± 0.08	0.02 ± 0.04
	$L \rightarrow \nu \bar{\nu}$	l .	Continu	ed on next page
			Continu	ca on next page

Table 7 - continued from previous page

Table 7 – continued from previous page						
Sample	Classification	$\geq$ 4 jets MT2W < 200 250 < MET < 350	$\geq$ 4 jets MT2W < 200 350 < MET < 450	≥4jets MT2W< 200 MET > 450		
$t\bar{t}+W{ ightarrow}QQ$ , amenlo pythia 8	$ \begin{array}{c} \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \hline \text{Inclusve} \\ 1 \text{ lepton} \end{array} $	$\begin{array}{c} 0.19 \pm 0.12 \\$	$\begin{array}{c} 0.07 \pm 0.05 \\$	$\begin{array}{c} 0.04 \pm 0.04 \\ 0.02 \pm 0.02 \\$		
$tar{t}+Z$	1 lepton, from $W$ 1 lepton, from $t$ $\geq$ 2 leptons $Z \rightarrow \nu \nu$	$\begin{array}{c}$	$\begin{array}{c} - \\ 0.00 \pm 0.00 \\ - \\ 0.39 \pm 0.02 \end{array}$	$\begin{array}{c}\\ 0.00 \pm 0.00\\ 0.00 \pm 0.00\\ 0.09 \pm 0.01 \end{array}$		
$tar{t}+Z,\ \mathrm{madgraph}$	Inclusve 1 lepton 1 lepton, from $W$ 1 lepton, from $t$ $\geq$ 2 leptons $Z \rightarrow \nu \nu$	$\begin{array}{c} 1.95 \pm 0.05 \\ 0.01 \pm 0.00 \\$	$0.40 \pm 0.02 \\ 0.00 \pm 0.00 \\$	$\begin{array}{c} 0.09 \pm 0.01 \\ 0.00 \pm 0.00 \\$		
$t ar t + Z \!  ightarrow \! Q Q,$ amenlo pythia8	Inclusve 1 lepton 1 lepton, from W 1 lepton, from t $\geq$ 2 leptons $Z \rightarrow \nu \nu$	$\begin{array}{c} 0.27 \pm 0.18 \\ - \\ - \\ - \\ 0.27 \pm 0.18 \\ - \end{array}$	— — — —	$\begin{array}{c} 0.21 \pm 0.14 \\ - \\ - \\ - \\ 0.21 \pm 0.14 \\ - \end{array}$		
$tar{t} + Z { ightarrow} 2\ell 2  u,$ amenlo pythia 8	Inclusve 1 lepton 1 lepton, from W 1 lepton, from t $\geq$ 2 leptons $Z \rightarrow \nu \nu$	$\begin{array}{c} 2.66 \pm 0.53 \\ - \\ - \\ - \\ 0.11 \pm 0.09 \\ 2.55 \pm 0.52 \end{array}$	$\begin{array}{c} 0.33 \pm 0.21 \\$	$\begin{array}{c} 0.22 \pm 0.12 \\$		

CR0b, Nominal Systematic, Yield Table for Input Samples

	CR0b, Nomi	nal Systematic, Yield T				
		≥4jets	≥4jets	≥4jets	≥4jets	≥4jets
Sample	Classification	MT2W≥ 200	$MT2W \ge 200$	MT2W≥ 200	$MT2W \ge 200$	$MT2W \ge 200$
		250 < MET < 350	350 < MET < 450	450 < MET < 550	550 < MET < 650	MET > 650
Data, single $e/\mu$ , MET	Inclusve	86.00 ± 9.27	$32.00 \pm 5.66$	$6.00 \pm 2.45$	$6.00 \pm 2.45$	$7.00 \pm 2.65$
	Inclusve	118.73 ± 11.74	$34.72 \pm 3.03$	$13.45 \pm 1.72$	$7.72 \pm 1.63$	$5.99 \pm 1.11$
All Background	1 lepton	62.04 ± 5.44	$21.62 \pm 2.79$	9.22 ± 1.60	$4.53 \pm 0.97$	$4.62 \pm 1.06$
	1 lepton, from W	60.36 + 5.42	21.33 + 2.78	9.22 ± 1.60	$4.53 \pm 0.97$	$4.56 \pm 1.06$
	1 lepton, from t	1.68 ± 0.55	0.29 ± 0.28	3.22 ± 1.00	4.00 ± 0.01	$0.06 \pm 0.06$
	> 2 leptons	49.14 ± 10.35	8.77 ± 0.97	$1.78 \pm 0.41$	$2.42 \pm 1.29$	$0.56 \pm 0.20$
	$Z \rightarrow \nu \nu$	7.55 ± 0.98	4.33 ± 0.67	$2.45 \pm 0.48$	$0.77 \pm 0.26$	$0.81 \pm 0.25$
$tar{t}$	Inclusve	$30.70 \pm 2.14$	6.83 ± 0.90	$1.32 \pm 0.34$	$0.62 \pm 0.25$	$0.26 \pm 0.13$
	1 lepton	$1.64 \pm 0.55$	0.28 ± 0.28	1.02 ± 0.01	0:02 ± 0:20	$0.06 \pm 0.06$
	1 lepton, from W	1.01 ± 0.00	0:20 ± 0:20	_	_	- 0.00
	1 lepton, from t	$1.64 \pm 0.55$	$0.28 \pm 0.28$	_	_	$0.06 \pm 0.06$
	> 2 leptons	29.06 ± 2.07	$6.54 \pm 0.86$	$1.32 \pm 0.34$	$0.62 \pm 0.25$	$0.20 \pm 0.12$
	$Z \rightarrow \nu \nu$					
	Inclusve	$0.41 \pm 0.41$	$0.28 \pm 0.28$	_	_	
$tar{t}$ , single lepFromT, madgraph pythia8	1 lepton	$0.41 \pm 0.41$	0.28 ± 0.28	_		_
	1 lepton, from W	0.41 ± 0.41	0.20 ± 0.20			_
	1 lepton, from t	$0.41 \pm 0.41$	$0.28 \pm 0.28$			_
	> 2 leptons	0.41 ± 0.41	0.28 ± 0.28			_
	$Z \rightarrow \nu \nu$	_	_			_
	Inclusve	1.23 ± 0.36	_			$0.06 \pm 0.06$
$t\bar{t},$ single lep FromTbar, madgraph pythia 8, ext1	1 lepton	1.23 ± 0.36				$0.06 \pm 0.06$ $0.06 \pm 0.06$
	1 lepton, from W	1.23 ± 0.30				0.00 ± 0.00
	1 lepton, from t	$1.23 \pm 0.36$				$0.06 \pm 0.06$
	> 2 leptons	1.20 ± 0.30				0.00 ± 0.00
	$Z \rightarrow \nu \nu$	_	_	_		_
	Inclusve	29.06 ± 2.07	$6.54 \pm 0.86$	$1.32 \pm 0.34$	$0.62 \pm 0.25$	$0.20 \pm 0.12$
$t\bar{t},$ di Lepton, madgraph pythia 8, ext 1	1 lepton	25.00 ± 2.07	0.54 ± 0.50	1.02 ± 0.54	0.02 ± 0.20	0.20 ± 0.12
	1 lepton, from W	_				_
	1 lepton, from t	_	_	_		_
	> 2 leptons	29.06 ± 2.07	$6.54 \pm 0.86$	$1.32 \pm 0.34$	$0.62 \pm 0.25$	$0.20 \pm 0.12$
	$Z \rightarrow \nu \nu$		0.01 ± 0.00	1.02 ± 0.01	0:02 ± 0:20	- C.20 ± C.12
	Inclusve	2.22 ± 1.58	_	_	$1.24 \pm 1.24$	
single $t$	1 lepton	1.19 + 1.19	_	_	1.21 ± 1.21	_
	1 lepton, from W	1.19 ± 1.19	_	_		_
	1 lepton, from t	1110 ± 1110	_	_		_
	≥ 2 leptons	1.03 ± 1.03	_	_	$1.24 \pm 1.24$	_
	$Z \rightarrow \nu \nu$		_	_		_
	Inclusve	2.22 ± 1.58	_	_	$1.24 \pm 1.24$	
single $t$ $t$ — $W$ -channel	1 lepton	1.19 ± 1.19	_	_		_
	1 lepton, from W	1.19 ± 1.19	_	_		_
	1 lepton, from t	1	_	_		_
	> 2 leptons	1.03 ± 1.03	_	_	$1.24 \pm 1.24$	_
	$Z \rightarrow \nu \nu$	I	_	_		_
	Inclusve	_	_	_	_	_
single $t,\ t-W$ -channel, powheg pythia8	1 lepton	_	_	_	_	_
	1 lepton, from W	l —	_	_	_	_
	1 lepton, from t	_	_	_	_	_
	≥ 2 leptons	_	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_	_
single $ar{t},\ t-W$ -channel, powheg pythia8	Inclusve	$2.22 \pm 1.58$	_	_	$1.24 \pm 1.24$	_
	1 lepton	1.19 ± 1.19	_	_	_	_
	1 lepton, from W	$1.19 \pm 1.19$	_	_	_	_
	1 lepton, from t	_	_	_	_	_
	≥ 2 leptons	$1.03 \pm 1.03$	_	_	$1.24 \pm 1.24$	_
	$Z \rightarrow \nu \nu$	_	_	_	_	_
single $t$ non $t-W$ -channel	Inclusve	_	_	_	_	_
	1 lepton	_	_	_	_	_
	1 lepton, from W	_	_	<u> </u>	_	_
	1 lepton, from t	l —	_	_	_	_
	≥ 2 leptons	_	_	_	_	_
	$Z \rightarrow \nu \nu$	I	I		_	
	$Z \rightarrow \nu \nu$		_			

Table 8 – continued from previous page								
Sample	Classification	$\geq$ 4jets MT2W $\geq$ 200 250 < MET < 350	$\geq$ 4jets MT2W $\geq$ 200 350 < MET < 450	$\geq$ 4jets MT2W $\geq$ 200 450 < MET < 550	$\geq$ 4 jets MT2W $\geq$ 200 550 < MET < 650	$\geq$ 4jets MT2W $\geq$ 200 MET > 650		
	Inclusve							
	1 lepton							
	1 lepton, from W			_		_		
single $t$ , s-channel, amcnlo pythia8	1 lepton, from t	_	_	_	_			
	> 2 leptons		_	_	_	_		
	$Z \rightarrow \nu \nu$			_				
	Inclusve	$68.05 \pm 11.26$	$20.56 \pm 2.73$	$8.54 \pm 1.53$	$4.06 \pm 0.88$	$4.17 \pm 1.01$		
	1 lepton	53.82 ± 5.05	$20.56 \pm 2.73$	8.54 ± 1.53	4.06 ± 0.88	$4.17 \pm 1.01$ $4.17 \pm 1.01$		
	1 lepton, from W	53.82 ± 5.05	$20.56 \pm 2.73$	8.54 ± 1.53	4.06 ± 0.88	$4.17 \pm 1.01$ $4.17 \pm 1.01$		
V+Jets	1 lepton, from t	05.02 ± 0.00	20.50 ± 2.75	0.04 ± 1.00	4.00 ± 0.00	4.17 ± 1.01		
	> 2 leptons	$14.23 \pm 10.06$		_	_	_		
	$Z \rightarrow \nu \nu$	14.25 ± 10.00		_				
	Inclusve	14.23 ± 10.06		_		_		
	1 lepton	14.23 ± 10.00	_			_		
	1 lepton, from W	_	_	_	_	_		
$DY+Jets \rightarrow \ell\ell$	1 lepton, from t							
	> 2 leptons	$14.23 \pm 10.06$		_				
	$Z \rightarrow \nu \nu$	14.23 ± 10.00	_					
	Inclusve		_					
	1 lepton							
	1 lepton from W							
DY+Jets→ ℓℓ, M10to50, amcnlo pythia8	1 lepton, from t	_	_	_	_			
	> 2 leptons	_		_	_			
	$Z \rightarrow \nu \nu$							
	Inclusve	14.23 ± 10.06		_				
	1 lepton	14.23 ± 10.00	_	_	_	_		
	1 lepton, from W		_	_				
DY+Jets→ ℓℓ, M50, amcnlo pythia8	1 lepton, from t	_	_	_	_	_		
	> 2 leptons	$14.23 \pm 10.06$		_		_		
	$Z \rightarrow \nu \nu$	14.25 ± 10.00		_		_		
	Inclusve	53.82 ± 5.05	$20.56 \pm 2.73$	$8.54 \pm 1.53$	$4.06 \pm 0.88$	$4.17 \pm 1.01$		
	1 lepton	53.82 ± 5.05	$20.56 \pm 2.73$	8.54 ± 1.53	$4.06 \pm 0.88$	$4.17 \pm 1.01$ $4.17 \pm 1.01$		
	1 lepton, from W	53.82 ± 5.05	$20.56 \pm 2.73$	8.54 ± 1.53	4.06 ± 0.88	$4.17 \pm 1.01$ $4.17 \pm 1.01$		
W+Jets $\rightarrow \ell \nu$	1 lepton, from t		20.00 ± 2.10	0.01 ± 1.00				
	> 2 leptons	_		_		_		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
	Inclusve	2.68 ± 1.90		_	_	$0.71 \pm 0.71$		
	1 lepton	2.68 ± 1.90	_	_	_	$0.71 \pm 0.71$		
	1 lepton, from W	2.68 ± 1.90	_	_	_	$0.71 \pm 0.71$		
W+Jets $\rightarrow \ell \nu$ , 100 $<$ $HT$ $<$ 200, madgraph pythia8	1 lepton, from t	2.00 ± 1.00	_	_	_			
	> 2 leptons	_	_	_	_	_		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
	Inclusve	16.26 ± 3.20	$3.92 \pm 1.50$	$1.03 \pm 0.73$	_	$0.31 \pm 0.31$		
	1 lepton	$16.26 \pm 3.20$	$3.92 \pm 1.50$	$1.03 \pm 0.73$	_	$0.31 \pm 0.31$		
MILT. 4 000 CHT C 400 1 1 11 11 1	1 lepton, from W	$16.26 \pm 3.20$	$3.92 \pm 1.50$	$1.03 \pm 0.73$	_	$0.31 \pm 0.31$		
W+Jets $\rightarrow \ell \nu$ , 200 < $HT$ < 400, madgraph pythia8	1 lepton, from t		_		_			
	≥ 2 leptons	_	_	_	_	_		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
	Inclusve	$15.73 \pm 3.21$	$7.75 \pm 2.16$	$2.76 \pm 1.23$	$1.40 \pm 0.81$	$1.02 \pm 0.59$		
	1 lepton	$15.73 \pm 3.21$	$7.75 \pm 2.16$	$2.76 \pm 1.23$	$1.40 \pm 0.81$	$1.02 \pm 0.59$		
MILT. 4 400 CHTC COO. 1 1 1110	1 lepton, from W	$15.73 \pm 3.21$	$7.75 \pm 2.16$	$2.76 \pm 1.23$	$1.40 \pm 0.81$	$1.02 \pm 0.59$		
W+Jets $\rightarrow \ell \nu$ , 400 $<$ $HT$ $<$ 600, madgraph pythia8	1 lepton, from t	_	_	_	_			
	≥ 2 leptons	_	_	_	_	-		
	$Z \rightarrow \nu \nu$	_	_	_	_	-		
	Inclusve	$8.88 \pm 0.87$	$3.38 \pm 0.50$	$2.48 \pm 0.43$	$0.97 \pm 0.24$	$0.40 \pm 0.13$		
	1 lepton	$8.88 \pm 0.87$	$3.38 \pm 0.50$	$2.48 \pm 0.43$	$0.97 \pm 0.24$	$0.40 \pm 0.13$		
W+Jets $\rightarrow \ell \nu$ , 600 < HT < 800, madgraph pythia8	1 lepton, from W	$8.88 \pm 0.87$	$3.38 \pm 0.50$	$2.48 \pm 0.43$	$0.97 \pm 0.24$	$0.40 \pm 0.13$		
w ⊤Jcls→ εν, ουυ < n 1 < ουυ, maugraph pythias	1 lepton, from t	-	_	_	_	_		
	≥ 2 leptons	_	_	_	_	_		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
	•	-		•	Continu	ed on next page		

Table 8 – continued from previous page								
		≥4jets	≥4jets	≥4jets	≥4jets	≥4jets		
Sample	Classification	$MT2W \ge 200$	$MT2W \ge 200$	$MT2W \ge 200$	$MT2W \ge 200$	$MT2W \ge 200$		
		250 < MET < 350	350 < MET < 450	450 < MET < 550	550 < MET < 650	MET > 650		
	Inclusve	$7.02 \pm 0.40$	3.38 ± 0.26	$1.58 \pm 0.17$	$1.01 \pm 0.12$	$0.92 \pm 0.10$		
	1 lepton	$7.02 \pm 0.40$ $7.02 \pm 0.40$	3.38 ± 0.26	$1.58 \pm 0.17$ $1.58 \pm 0.17$	$1.01 \pm 0.12$ $1.01 \pm 0.12$	$0.92 \pm 0.10$ $0.92 \pm 0.10$		
W+Jets $\rightarrow \ell \nu$ , 800 $< HT < 1200$ , madgraph pythia8	1 lepton, from W	$7.02 \pm 0.40$	$3.38 \pm 0.26$	$1.58 \pm 0.17$	$1.01 \pm 0.12$	$0.92 \pm 0.10$		
	1 lepton, from $t$	_	_	_	_	_		
	≥ 2 leptons	_	_	<del>-</del>	_	_		
	$Z \rightarrow \nu \nu$	_	_	<u> </u>	_	_		
	Inclusve	$2.98 \pm 0.61$	$2.00 \pm 0.47$	$0.63 \pm 0.26$	$0.67 \pm 0.24$	$0.77 \pm 0.22$		
	1 lepton	$2.98 \pm 0.61$	$2.00 \pm 0.47$	$0.63 \pm 0.26$	$0.67 \pm 0.24$	$0.77 \pm 0.22$		
<u></u>	1 lepton, from W	$2.98 \pm 0.61$	$2.00 \pm 0.47$	$0.63 \pm 0.26$	$0.67 \pm 0.24$	$0.77 \pm 0.22$		
W+Jets $\rightarrow \ell \nu$ , 1200 $< HT < 2500$ , madgraph pythia8	1 lepton, from t							
	> 2 leptons			_	_	_		
	$Z \rightarrow \nu \nu$							
	Inclusve	0.26 ± 0.03	$0.14 \pm 0.02$	0.06 ± 0.01	0.02 ± 0.01	$0.05 \pm 0.01$		
	1 lepton	$0.26 \pm 0.03$	$0.14 \pm 0.02$	$0.06 \pm 0.01$	$0.02 \pm 0.01$	$0.05 \pm 0.01$		
W+Jets $\rightarrow \ell \nu$ , 2500 < HT < Inf, madgraph pythia8	1 lepton, from W	$0.26 \pm 0.03$	$0.14 \pm 0.02$	$0.06 \pm 0.01$	$0.02 \pm 0.01$	$0.05 \pm 0.01$		
W   voto · cr, 2000 ( III ( Inj, maagraph pythiao	1 lepton, from $t$	_	_	_	_	_		
	≥ 2 leptons	_	_	<del>-</del>	_	_		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
	Inclusve	$17.76 \pm 2.01$	$7.33 \pm 0.96$	$3.60 \pm 0.71$	$1.80 \pm 0.53$	$1.56 \pm 0.44$		
	1 lepton	5.38 ± 1.57	$0.77 \pm 0.52$	$0.68 \pm 0.48$	$0.46 \pm 0.40$	$0.39 \pm 0.32$		
	1 lepton, from W	5.35 ± 1.57	$0.77 \pm 0.52$	$0.68 \pm 0.48$	$0.46 \pm 0.40$	$0.39 \pm 0.32$		
Rare	1 lepton, from t	0.04 ± 0.03	0.00 ± 0.00	0.00 ± 0.10	0.10 ± 0.10	0.00 ± 0.02		
	> 2 leptons	$4.82 \pm 0.79$	2.23 + 0.45	$0.46 \pm 0.22$	$0.56 \pm 0.24$	$0.36 \pm 0.16$		
	$Z \rightarrow \nu \nu$	7.55 ± 0.98	$4.33 \pm 0.67$	$2.45 \pm 0.48$	$0.77 \pm 0.26$	$0.81 \pm 0.10$		
	Inclusve	$15.49 \pm 1.99$	$5.96 \pm 0.94$	$3.32 \pm 0.70$	$1.71 \pm 0.53$	$1.52 \pm 0.44$		
	1 lepton	$5.35 \pm 1.57$	$0.77 \pm 0.52$	$0.68 \pm 0.48$	$0.46 \pm 0.40$	$0.39 \pm 0.32$		
diBoson	1 lepton, from W	$5.35 \pm 1.57$	$0.77 \pm 0.52$	$0.68 \pm 0.48$	$0.46 \pm 0.40$	$0.39 \pm 0.32$		
diboon	1 lepton, from $t$	_	_	<del>-</del>	_	_		
	≥ 2 leptons	$4.09 \pm 0.74$	$1.56 \pm 0.42$	$0.45 \pm 0.20$	$0.55 \pm 0.23$	$0.35 \pm 0.16$		
	$Z \rightarrow \nu \nu$	$6.06 \pm 0.98$	$3.63 \pm 0.67$	$2.19 \pm 0.48$	$0.69 \pm 0.26$	$0.78 \pm 0.25$		
	Inclusve	$7.81 \pm 1.72$	$1.93 \pm 0.65$	$0.80 \pm 0.51$	$0.90 \pm 0.46$	$0.67 \pm 0.36$		
	1 lepton	$4.10 \pm 1.55$	$0.51 \pm 0.51$	$0.47 \pm 0.47$	$0.40 \pm 0.40$	$0.32 \pm 0.32$		
	1 lepton, from W	$4.10 \pm 1.55$	$0.51 \pm 0.51$	$0.47 \pm 0.47$	$0.40 \pm 0.40$	$0.32 \pm 0.32$		
WW	1 lepton, from t							
	> 2 leptons	$3.71 \pm 0.73$	$1.42 \pm 0.41$	$0.33 \pm 0.19$	$0.51 \pm 0.23$	$0.35 \pm 0.16$		
	$Z \rightarrow \nu \nu$	3.71 ± 0.73	1.42 ± 0.41	0.33 ± 0.19	0.31 ± 0.23	0.33 ± 0.10		
		2.51   0.52	1 10   0 11	0.00   0.10	0.51   0.00	0.95   0.10		
	Inclusve	$3.71 \pm 0.73$	$1.42 \pm 0.41$	$0.33 \pm 0.19$	$0.51 \pm 0.23$	$0.35 \pm 0.16$		
	1 lepton	_	_	<del>-</del>	_	_		
$WW \rightarrow 2\ell 2\nu$ , powheg	1 lepton, from W	_	_	_	_	_		
,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,	1 lepton, from $t$	_	_	_	_	_		
	$\geq$ 2 leptons	$3.71 \pm 0.73$	$1.42 \pm 0.41$	$0.33 \pm 0.19$	$0.51 \pm 0.23$	$0.35 \pm 0.16$		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
	Inclusve	$4.10 \pm 1.55$	$0.51 \pm 0.51$	$0.47 \pm 0.47$	$0.40 \pm 0.40$	$0.32 \pm 0.32$		
	1 lepton	$4.10 \pm 1.55$	$0.51 \pm 0.51$	$0.47 \pm 0.47$	$0.40 \pm 0.40$	$0.32 \pm 0.32$		
	1 lepton, from W	4.10 ± 1.55	$0.51 \pm 0.51$	$0.47 \pm 0.47$	$0.40 \pm 0.40$	$0.32 \pm 0.32$		
$WW \rightarrow \ell \nu qq$ , powheg	1 lepton, from t							
	> 2 leptons	_	_	_	_	_		
	$Z \rightarrow \nu \nu$	_	_			l _		
		7 50 + 1 01	2 02 1 0 68	2.46 ± 0.40	0.70 ± 0.26	0.02 ± 0.25		
	Inclusve	7.50 ± 1.01	3.93 ± 0.68	$2.46 \pm 0.49$	$0.79 \pm 0.26$	$0.83 \pm 0.25$		
	1 lepton	$1.24 \pm 0.20$	$0.26 \pm 0.12$	$0.21 \pm 0.08$	0.07 ± 0.05	$0.07 \pm 0.03$		
WZ	1 lepton, from W	$1.24 \pm 0.20$	$0.26 \pm 0.12$	$0.21 \pm 0.08$	$0.07 \pm 0.05$	$0.07 \pm 0.03$		
··· =	1 lepton, from $t$	_	_	<del>-</del>	<del>-</del>	_		
	$\geq$ 2 leptons	$0.38 \pm 0.13$	$0.13 \pm 0.08$	$0.12 \pm 0.07$	$0.05 \pm 0.04$	-		
	$Z \rightarrow \nu \nu$	$5.88 \pm 0.98$	$3.54 \pm 0.67$	$2.12 \pm 0.48$	$0.67 \pm 0.26$	$0.76 \pm 0.25$		
	Inclusve	$0.30 \pm 0.12$	$0.13 \pm 0.07$	$0.12 \pm 0.07$	$0.03 \pm 0.03$	_		
	1 lepton					_		
	1 lepton, from W	_	_	_	_	_		
$WZ\rightarrow 3\ell\nu$ , powheg pythia8	1 lepton, from t	_	_	_	_	l _		
	≥ 2 leptons	$0.30 \pm 0.12$	$0.13 \pm 0.07$	$0.12 \pm 0.07$	$0.03 \pm 0.03$	_		
	$Z \rightarrow \nu \nu$	0.50 ± 0.12	1 0.10 ± 0.07	0.12 ± 0.01	0.00 ± 0.00	_		
	$L \rightarrow \nu \nu$							
					Continu	ed on next page		

Table 8 – continued from previous page								
		≥4jets	≥4jets	≥4jets	≥4jets	≥4jets		
Sample	Classification	MT2W≥ 200	MT2W≥ 200	MT2W≥ 200	MT2W≥ 200	MT2W≥ 200		
		250 < MET < 350	350 < MET < 450	450 < MET < 550	550 < MET < 650	MET > 650		
	Inclusve	$0.08 \pm 0.03$	_	_	$0.01 \pm 0.01$	_		
	1 lepton	_	_	_	_	_		
$WZ \rightarrow 2\ell 2Q$ , amenlo pythia8	1 lepton, from W	_	_	_	_	_		
• / • • • • • • • • • • • • • • • • • •	1 lepton, from t	0.08 ± 0.03	_			_		
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	0.08 ± 0.03	_	_	$0.01 \pm 0.01$	_		
	$Z \rightarrow \nu\nu$ Inclusve	1.24 ± 0.20	$0.26 \pm 0.12$	0.21 ± 0.08	$0.07 \pm 0.05$	$0.07 \pm 0.03$		
	1 lepton	$1.24 \pm 0.20$ $1.24 \pm 0.20$	$0.26 \pm 0.12$ $0.26 \pm 0.12$	$0.21 \pm 0.08$ $0.21 \pm 0.08$	$0.07 \pm 0.05$ $0.07 \pm 0.05$	$0.07 \pm 0.03$ $0.07 \pm 0.03$		
	1 lepton, from W	$1.24 \pm 0.20$ $1.24 \pm 0.20$	$0.26 \pm 0.12$ $0.26 \pm 0.12$	0.21 ± 0.08	$0.07 \pm 0.05$	$0.07 \pm 0.03$ $0.07 \pm 0.03$		
$WZ\rightarrow \ell\nu 2Q$ , amcnlo pythia8	1 lepton, from t							
	> 2 leptons	_	_	_	_	_		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
	Inclusve	$5.88 \pm 0.98$	$3.54 \pm 0.67$	$2.12 \pm 0.48$	$0.67 \pm 0.26$	$0.76 \pm 0.25$		
	1 lepton	_	_	_	_	_		
$WZ \rightarrow 1\ell 3\nu$ , amenlo pythia8	1 lepton, from W	-	_	_	_	_		
77 Z · 1007, dimento pytindo	1 lepton, from t	_	_	_	_	_		
	≥ 2 leptons							
	$Z \rightarrow \nu \nu$	5.88 ± 0.98	$3.54 \pm 0.67$	$2.12 \pm 0.48$	$0.67 \pm 0.26$	$0.76 \pm 0.25$		
	Inclusve 1 lepton	$0.18 \pm 0.02$	$0.10 \pm 0.02$	$0.06 \pm 0.01$	$0.01 \pm 0.01$	$0.02 \pm 0.00$		
	1 lepton from W							
ZZ	1 lepton, from t		_	_	_	_		
	> 2 leptons	$0.00 \pm 0.01$	$0.01 \pm 0.01$	_	_	_		
	$Z \rightarrow \nu \nu$	$0.18 \pm 0.02$	$0.09 \pm 0.01$	$0.06 \pm 0.01$	$0.01 \pm 0.01$	$0.02 \pm 0.00$		
	Inclusve	$0.00 \pm 0.01$	$0.01 \pm 0.01$	_		_		
	1 lepton	_	_	_	_	_		
$ZZ \rightarrow 2\ell 2Q$ , amenlo pythia8	1 lepton, from W	-	_	_	_	_		
22 · 2020g, amonto py mao	1 lepton, from t	<del>_</del>		_	_	_		
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	$0.00 \pm 0.01$	$0.01 \pm 0.01$	_	<del>-</del>	_		
	$Z \rightarrow \nu \nu$ Inclusve	0.15 ± 0.01	0.09 ± 0.01	0.06 ± 0.01	0.01 ± 0.00	$0.02 \pm 0.00$		
	1 lepton	0.13 ± 0.01	0.09 ± 0.01	0.00 ± 0.01	0.01 ± 0.00	0.02 ± 0.00		
	1 lepton, from W	_	_	_	_	_		
$ZZ\rightarrow 2\ell 2\nu$ , powheg pythia8	1 lepton, from t	_	_	_	_	_		
	≥ 2 leptons	_	_	_	_	_		
	$Z \rightarrow \nu \nu$	$0.15 \pm 0.01$	$0.09 \pm 0.01$	$0.06 \pm 0.01$	$0.01 \pm 0.00$	$0.02 \pm 0.00$		
	Inclusve	$0.03 \pm 0.01$	_	$0.00 \pm 0.00$	$0.00 \pm 0.01$	_		
	1 lepton	_	_	_	_	_		
$ZZ\rightarrow 2Q2\nu$ , amenlo pythia8	1 lepton, from W	_	_	_	_			
	1 lepton, from $t$ > 2 leptons	_	_	_	<del>-</del>	_		
	$Z \rightarrow \nu \nu$	0.03 ± 0.01		$0.00 \pm 0.00$	$0.00 \pm 0.01$			
	Inclusve	2.27 ± 0.27	$1.37 \pm 0.18$	0.28 ± 0.08	0.09 ± 0.07	$0.04 \pm 0.05$		
	1 lepton	$0.04 \pm 0.06$	0.00 ± 0.00	1 0.20 ± 0.00				
4#   W	1 lepton, from W	_	_	_	_	_		
$t\bar{t}+V$	1 lepton, from t	$0.04 \pm 0.03$	$0.00 \pm 0.00$	_	_	_		
	$\geq$ 2 leptons	$0.74 \pm 0.26$	$0.67 \pm 0.18$	$0.01 \pm 0.08$	$0.01 \pm 0.07$	$0.01 \pm 0.05$		
	$Z \rightarrow \nu \nu$	$1.49 \pm 0.04$	$0.70 \pm 0.03$	$0.27 \pm 0.02$	$0.08 \pm 0.01$	$0.03 \pm 0.00$		
	Inclusve	$0.75 \pm 0.27$	$0.66 \pm 0.18$	$0.00 \pm 0.08$	$0.01 \pm 0.07$	$0.01 \pm 0.05$		
	1 lepton	$0.03 \pm 0.06$	_	_	_	_		
$tar{t}+W$	1 lepton, from W 1 lepton, from t	0.03 ± 0.03	_	_	_	_		
	> 2 leptons	$0.03 \pm 0.03$ $0.72 \pm 0.26$	$0.66 \pm 0.18$	0.00 ± 0.08	$0.01 \pm 0.07$	$0.01 \pm 0.05$		
	$Z \rightarrow \nu \nu$	1 0.72 ± 0.20	1 0.00 ± 0.10	0.00 ± 0.00	- 0.01	J.01 ± 0.03		
	Inclusve	$0.56 \pm 0.25$	$0.54 \pm 0.17$	$0.00 \pm 0.08$	$0.01 \pm 0.05$	_		
	1 lepton					_		
$t\bar{t} + W \rightarrow \ell\nu$ , amenlo pythia8	1 lepton, from W	_	_	_	_	_		
$\iota\iota + \iota v \rightarrow \iota \nu$ , amenio pytinao	1 lepton, from $t$	_	_	_	_	_		
	≥ 2 leptons	$0.56 \pm 0.24$	$0.54 \pm 0.17$	$0.00 \pm 0.08$	$0.01 \pm 0.05$	_		
	$Z \rightarrow \nu \nu$	_	_	_				
					Continu	ed on next page		

Table 8 – continued from previous page							
		≥4jets	≥4jets	≥4jets	≥4jets	≥4jets	
Sample	Classification	$MT2W \ge 200$					
		250 < MET < 350	350 < MET < 450	450 < MET < 550	550 < MET < 650	MET > 650	
	Inclusve	$0.20 \pm 0.10$	$0.12 \pm 0.06$		_	$0.01 \pm 0.01$	
	1 lepton	$0.03 \pm 0.03$		_	_		
	1 lepton, from W		_	_	_	_	
$t\bar{t} + W \rightarrow QQ$ , amenlo pythia8	1 lepton, from t	$0.03 \pm 0.03$	_	_	_	_	
	> 2 leptons	$0.16 \pm 0.10$	$0.12 \pm 0.06$	_	_	$0.01 \pm 0.01$	
	$Z \rightarrow \nu \nu$	_	_	_	_	_	
	Inclusve	$1.51 \pm 0.04$	$0.71 \pm 0.03$	$0.27 \pm 0.02$	$0.08 \pm 0.01$	$0.03 \pm 0.00$	
	1 lepton	$0.01 \pm 0.00$	$0.00 \pm 0.00$	_	_	_	
$tar{t}+Z$	1 lepton, from W	_	_	_	_	_	
	1 lepton, from t	$0.01 \pm 0.00$	$0.00 \pm 0.00$	_	_	_	
	> 2 leptons	$0.02 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	_	_	
	$Z \rightarrow \nu \nu$	$1.49 \pm 0.04$	$0.70 \pm 0.03$	$0.27 \pm 0.02$	$0.08 \pm 0.01$	$0.03 \pm 0.00$	
	Inclusve	$1.51 \pm 0.04$	$0.71 \pm 0.03$	$0.27 \pm 0.02$	$0.08 \pm 0.01$	$0.03 \pm 0.00$	
	1 lepton	$0.01 \pm 0.00$	$0.00 \pm 0.00$	_	_	_	
4 T   7	1 lepton, from W	_	_	_	_	_	
$t\bar{t} + Z$ , madgraph	1 lepton, from $t$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	_	_	_	
	≥ 2 leptons	$0.02 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	_	_	
	$Z \rightarrow \nu \nu$	$1.49 \pm 0.04$	$0.70 \pm 0.03$	$0.27 \pm 0.02$	$0.08 \pm 0.01$	$0.03 \pm 0.00$	
	Inclusve	$0.22 \pm 0.12$	$0.02 \pm 0.05$	_	_	_	
	1 lepton	$0.04 \pm 0.04$	_	_	_	_	
$t\bar{t} + Z \rightarrow QQ$ , amenlo pythia8	1 lepton, from $W$	_	_	_	_	_	
tt + 2 - QQ, amenio pytinae	1 lepton, from $t$	$0.04 \pm 0.04$	_	_	_	_	
	≥ 2 leptons	$0.18 \pm 0.12$	$0.02 \pm 0.05$	_	_	_	
	$Z \rightarrow \nu \nu$	_	_	_	_	_	
	Inclusve	$1.74 \pm 0.50$	$1.49 \pm 0.31$	$0.12 \pm 0.16$	$0.18 \pm 0.09$	$0.10 \pm 0.05$	
	1 lepton	_	_	_	_	_	
$t\bar{t} + Z \rightarrow 2\ell 2\nu$ , amenlo pythia8	1 lepton, from W	_	_	_	_	_	
or, 2 .2025, amonto pythiao	1 lepton, from $t$	_	_	_	_	_	
	≥ 2 leptons	$0.01 \pm 0.05$	$0.00 \pm 0.05$	_	_	_	
	$Z \rightarrow \nu \nu$	$1.73 \pm 0.50$	$1.49 \pm 0.31$	$0.12 \pm 0.16$	$0.18 \pm 0.09$	$0.10 \pm 0.05$	

CR21, Nominal Systematic, Yield Table for Input Samples

CR2I, No	minal Systematic, Yield	Table for Input Sample		
		2jets	2jets	2jets
Sample	Classification	modTopness≥ 6.4	modTopness≥ 6.4	modTopness≥ 6.4
		250 < MET < 350	350 < MET < 450	MET > 450
Data, single $e/\mu$ , MET	Inclusve	$265.00 \pm 16.28$	$54.00 \pm 7.35$	$13.00 \pm 3.61$
	Inclusve	275.94 ± 19.67	47.79 ± 7.60	$10.41 \pm 1.11$
	1 lepton	8.03 ± 1.54	$1.39 \pm 0.29$	$0.43 \pm 0.14$
	1 lepton, from W	$5.43 \pm 1.40$	$0.81 \pm 0.16$	$0.43 \pm 0.14$ $0.43 \pm 0.14$
All Background	1 lepton, from t	$2.60 \pm 0.66$	$0.59 \pm 0.24$	0.43 ± 0.14
	> 2 leptons	266.17 ± 19.61	$45.95 \pm 7.59$	$9.78 \pm 1.10$
	$Z \rightarrow \nu \nu$	1.75 ± 0.04	$0.45 \pm 0.02$	$0.20 \pm 0.02$
	Inclusve	228.93 ± 3.83	33.75 ± 1.41	7.18 ± 0.70
	1 lepton	$2.50 \pm 0.65$	$0.59 \pm 0.24$	
.=	1 lepton, from W		<u> </u>	<u> </u>
$tar{t}$	1 lepton, from t	$2.50 \pm 0.65$	$0.59 \pm 0.24$	_
	> 2 leptons	$226.43 \pm 3.78$	$33.16 \pm 1.39$	$7.18 \pm 0.70$
	$Z \rightarrow \nu \nu$	_	<u> </u>	_
	Inclusve	$1.45 \pm 0.60$	$0.18 \pm 0.18$	_
	1 lepton	$1.45 \pm 0.60$	$0.18 \pm 0.18$	_
(7 : 1 1 P P 1 1 (1:0	1 lepton, from W	_	_	_
$t\bar{t}$ , single lepFromT, madgraph pythia8	1 lepton, from t	$1.45 \pm 0.60$	$0.18 \pm 0.18$	_
	≥ 2 leptons		_	-
	$Z \rightarrow \nu \nu$		<u> </u>	
<u> </u>	Inclusve	$1.04 \pm 0.26$	$0.41 \pm 0.16$	
	1 lepton	$1.04 \pm 0.26$	$0.41 \pm 0.16$	_
$t\bar{t}$ , single lepFromTbar, madgraph pythia8, ext1	1 lepton, from W	_	<del>-</del>	_
tt, single lepi tolii i bar, madgrapii pytinao, exti	1 lepton, from $t$	$1.04 \pm 0.26$	$0.41 \pm 0.16$	_
	$\geq$ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_		<del></del>
	Inclusve	$226.43 \pm 3.78$	$33.16 \pm 1.39$	$7.18 \pm 0.70$
	1 lepton	_	_	<del>-</del>
$t\bar{t}$ , diLepton, madgraph pythia8, ext1	1 lepton, from W	_	_	<del>-</del>
, , , , , , , , , , , , , , , , , , , ,	1 lepton, from t			
	≥ 2 leptons	$226.43 \pm 3.78$	$33.16 \pm 1.39$	$7.18 \pm 0.70$
	$Z \rightarrow \nu \nu$ Inclusve			1 24   0 72
	1 lepton	14.08 ± 2.97	$3.82 \pm 1.46$	$1.24 \pm 0.72$
	1 lepton 1 lepton, from W	0.10 ± 0.10	<del>-</del>	_
single t	1 lepton, from t	$0.10 \pm 0.10$	<del>_</del>	_
	> 2 leptons	13.98 ± 2.97	$3.82 \pm 1.46$	$1.24 \pm 0.72$
	$Z \rightarrow \nu \nu$	15.55 ± 2.51	3.02 ± 1.40	1.24 ± 0.72
	Inclusve	13.98 ± 2.97	$3.82 \pm 1.46$	$1.24 \pm 0.72$
	1 lepton	10.00 ± 2.01	0.02 ± 1.10	1.21 ± 0.12
	1 lepton, from W	_	_	_
single $t$ $t$ – $W$ -channel	1 lepton, from t	_	_	_
	≥ 2 leptons	$13.98 \pm 2.97$	$3.82 \pm 1.46$	$1.24 \pm 0.72$
	$Z \rightarrow \nu \nu$		_	_
	Inclusve	_	_	_
	1 lepton	_	_	_
single $t$ , $t - W$ -channel, powheg pythia8	1 lepton, from W		_	_
omate t, t w -channel, powneg pythias	1 lepton, from $t$		_	-
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	<del></del>	
	Inclusve	$13.98 \pm 2.97$	$3.82 \pm 1.46$	$1.24 \pm 0.72$
	1 lepton	_	_	_
single $\bar{t}$ , $t - W$ -channel, powheg pythia8	1 lepton, from W	_	_	_
- · · · · · · · · · · · · · · · · · · ·	1 lepton, from t	12.08 ± 2.07	2 92 ± 1 46	1 24 ± 0.72
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	$13.98 \pm 2.97$	$3.82 \pm 1.46$	$1.24 \pm 0.72$
	$Z \rightarrow \nu \nu$ Inclusve	0.10 - 0.10		_
	1 lepton	$0.10 \pm 0.10$ $0.10 \pm 0.10$	_	_
	1 lepton 1 lepton, from W	0.10 ± 0.10		
single $t$ non $t - W$ -channel	1 lepton, from w 1 lepton, from t	0.10 ± 0.10		
	≥ 2 leptons	0.10 ± 0.10		
	$Z \rightarrow \nu \nu$	_	_	_
	2		Cox	ntinued on next page
			Col	ternaca on next page

Table 9 – continued from previous page								
Sample	Classification	$\begin{array}{c} \text{2jets} \\ \text{modTopness} \geq 6.4 \\ 250 < MET < 350 \end{array}$	$2 \mathrm{jets}$ $\mathrm{modTopness} \geq 6.4$ $350 < MET < 450$	$2 \mathrm{jets}$ $\mathrm{modTopness} \geq 6.4$ $MET > 450$				
	Inclusve	$0.10 \pm 0.10$						
	1 lepton	$0.10 \pm 0.10$ $0.10 \pm 0.10$	<del>-</del>	_				
	1 lepton, from W	0.10 ± 0.10	<del>-</del>	_				
single t, s-channel, amenlo pythia8		$0.10 \pm 0.10$	<del></del>	_				
	1 lepton, from $t$ > 2 leptons	0.10 ± 0.10	<del></del>	_				
		_	<del>-</del>	_				
	$Z \rightarrow \nu \nu$ Inclusve	25.85 ± 19.05	$-$ 8.04 $\pm$ 7.31	$0.41 \pm 0.14$				
	1 lepton	$5.40 \pm 1.39$	$0.73 \pm 0.16$	$0.41 \pm 0.14$ $0.41 \pm 0.14$				
	1 lepton, from W	5.40 ± 1.39 5.40 ± 1.39	$0.73 \pm 0.16$ $0.73 \pm 0.16$	$0.41 \pm 0.14$ $0.41 \pm 0.14$				
V + Jets	1 lepton, from t	5.40 ± 1.39	0.73 ± 0.16	0.41 ± 0.14				
	> 2 leptons	$20.45 \pm 19.00$	$7.31 \pm 7.31$					
	$Z \rightarrow \nu \nu$	20.43 1 19.00	7.31 ± 7.31	_				
	Inclusve	20.45 ± 19.00	7.31 ± 7.31					
	1 lepton	20.45 ± 19.00	7.31 ± 7.31	_				
	1 lepton, from W	_	<del>_</del>	_				
$DY+Jets \rightarrow \ell\ell$	1 lepton, from t	_	<del>-</del>	_				
	> 2 leptons	$20.45 \pm 19.00$	$7.31 \pm 7.31$					
	$Z \rightarrow \nu \nu$	20.43 ± 19.00	7.31 ± 7.31					
	$Z \rightarrow \nu \nu$ Inclusve							
	1 lepton							
	1 lepton, from W			I =				
$DY+Jets \rightarrow \ell\ell$ , M10to50, amcnlo pythia8	1 lepton, from t	_	_	_				
	> 2 leptons	_		_				
	$Z \rightarrow \nu \nu$	_	_	_				
	Inclusve	$20.45 \pm 19.00$	$7.31 \pm 7.31$					
	1 lepton	20.45 1 19.00	7.51 ± 7.51					
	1 lepton, from W							
$DY+Jets \rightarrow \ell\ell$ , M50, amenlo pythia8	1 lepton, from t			_				
	> 2 leptons	$20.45 \pm 19.00$	$7.31 \pm 7.31$	_				
	$Z \rightarrow \nu \nu$	20.40 ± 13.00	7.51 ± 7.51	_				
	Inclusve	5.40 ± 1.39	$0.73 \pm 0.16$	$0.41 \pm 0.14$				
	1 lepton	5.40 ± 1.39	$0.73 \pm 0.16$	$0.41 \pm 0.11$ $0.41 \pm 0.14$				
	1 lepton, from W	5.40 ± 1.39	$0.73 \pm 0.16$	$0.41 \pm 0.11$ $0.41 \pm 0.14$				
W+Jets $\rightarrow \ell \nu$	1 lepton, from t							
	≥ 2 leptons	_	<u> </u>	_				
	$Z \rightarrow \nu \nu$	_	_	_				
	Inclusve	_	_	_				
	1 lepton	_	<u> </u>	_				
W. I. 4 100 ¢ W. 5 200 1 1 1 11 11	1 lepton, from W	_	_	_				
W+Jets $\rightarrow \ell \nu$ , 100 $< HT < 200$ , madgraph pythia8	1 lepton, from t	_	_	_				
	≥ 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$	_	_	_				
	Inclusve	$0.44 \pm 0.44$	_	_				
	1 lepton	$0.44 \pm 0.44$	_	_				
W+Jets $\rightarrow \ell \nu$ , 200 < HT < 400, madgraph pythia8	1 lepton, from W	$0.44 \pm 0.44$	_	_				
w TJets - tb, 200 < HI < 400, madgraph pythia8	1 lepton, from t	_	_	_				
	≥ 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$	_	<u> </u>					
<u> </u>	Inclusve	$2.10 \pm 1.25$						
	1 lepton	$2.10 \pm 1.25$	_	_				
W+Jets $\rightarrow \ell \nu$ , 400 < HT < 600, madgraph pythia8	1 lepton, from W	$2.10 \pm 1.25$	_	_				
** + 5005 - 60, 400 < 111 < 000, maugraph pythias	1 lepton, from t	_	_	_				
	≥ 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$							
·	Inclusve	$1.73 \pm 0.40$	$0.06 \pm 0.06$	$0.06 \pm 0.06$				
	1 lepton	$1.73 \pm 0.40$	$0.06 \pm 0.06$	$0.06 \pm 0.06$				
W+Jets $\rightarrow \ell \nu$ , 600 < HT < 800, madgraph pythia8	1 lepton, from W	$1.73 \pm 0.40$	$0.06 \pm 0.06$	$0.06 \pm 0.06$				
,, ooo ( 111 ( ooo, maagraph pythiao	1 lepton, from t	_	_	_				
	≥ 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$							
			Cor	ntinued on next page				

Table 9 – continued from previous page								
		2jets	2jets	2jets				
Sample	Classification	modTopness≥ 6.4	modTopness≥ 6.4	modTopness≥ 6.4				
		250 < MET < 350	350 < MET < 450	MET > 450				
	Inclusve	$1.13 \pm 0.19$	$0.59 \pm 0.12$	$0.21 \pm 0.07$				
	1 lepton	$1.13 \pm 0.19$	$0.59 \pm 0.12$	$0.21 \pm 0.07$				
W. I. 4 000 c HT c 1000 1 1 41'0	1 lepton, from W	$1.13 \pm 0.19$	$0.59 \pm 0.12$	$0.21 \pm 0.07$				
W+Jets $\rightarrow \ell \nu$ , 800 $< HT < 1200$ , madgraph pythia8	1 lepton, from t	_	_	_				
	> 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$	_	_	_				
	Inclusve	_	$0.08 \pm 0.08$	$0.14 \pm 0.10$				
	1 lepton	_	$0.08 \pm 0.08$	$0.14 \pm 0.10$				
W. I. 4 1000 c H/T c 0500 1 1 (1')	1 lepton, from W	_	$0.08 \pm 0.08$	$0.14 \pm 0.10$				
W+Jets $\rightarrow \ell \nu$ , 1200 $< HT < 2500$ , madgraph pythia8	1 lepton, from $t$	_	_	_				
	≥ 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$	_	_	_				
	Inclusve	_	_	$0.00 \pm 0.00$				
	1 lepton	_	_	$0.00 \pm 0.00$				
THE TAX OF SOCIETY OF THE STATE	1 lepton, from W	_	_	$0.00 \pm 0.00$				
W+Jets $\rightarrow \ell \nu$ , 2500 $< HT < Inf$ , madgraph pythia8	1 lepton, from $t$	_	_	_				
	≥ 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$	_	_	_				
	Inclusve	$7.09 \pm 0.74$	$2.18 \pm 0.39$	$1.58 \pm 0.44$				
	1 lepton	$0.03 \pm 0.04$	$0.08 \pm 0.04$	$0.02 \pm 0.02$				
Rare	1 lepton, from W	$0.03 \pm 0.04$	$0.08 \pm 0.04$	$0.02 \pm 0.02$				
nare	1 lepton, from $t$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	_				
	≥ 2 leptons	$5.31 \pm 0.74$	$1.66 \pm 0.39$	$1.36 \pm 0.44$				
	$Z \rightarrow \nu \nu$	$1.75 \pm 0.04$	$0.45 \pm 0.02$	$0.20 \pm 0.02$				
	Inclusve	$4.26 \pm 0.70$	$1.63 \pm 0.37$	$1.35 \pm 0.43$				
	1 lepton	$0.03 \pm 0.04$	$0.08 \pm 0.04$	$0.02 \pm 0.02$				
diBoson	1 lepton, from W	$0.03 \pm 0.04$	$0.08 \pm 0.04$	$0.02 \pm 0.02$				
diboson	1 lepton, from $t$	-	<del>-</del>	_				
	$\geq$ 2 leptons	$3.85 \pm 0.70$	$1.42 \pm 0.37$	$1.24 \pm 0.43$				
	$Z \rightarrow \nu \nu$	$0.37 \pm 0.02$	$0.13 \pm 0.01$	$0.09 \pm 0.01$				
	Inclusve	$2.88 \pm 0.67$	$1.00 \pm 0.34$	$0.76 \pm 0.38$				
	1 lepton	_	<del>-</del>	_				
WW	1 lepton, from W	_	<del>-</del>	_				
	1 lepton, from $t$	_	<del>-</del>	_				
	$\geq$ 2 leptons	$2.88 \pm 0.67$	$1.00 \pm 0.34$	$0.76 \pm 0.38$				
	$Z \rightarrow \nu \nu$			_				
	Inclusve	$2.88 \pm 0.67$	$1.00 \pm 0.34$	$0.76 \pm 0.38$				
	1 lepton	_	_	_				
$WW \rightarrow 2\ell 2\nu$ , powheg	1 lepton, from W	_	_	_				
71	1 lepton, from t							
	≥ 2 leptons	$2.88 \pm 0.67$	$1.00 \pm 0.34$	$0.76 \pm 0.38$				
	$Z \rightarrow \nu \nu$	_	<del>_</del>	_				
	Inclusve	_	_					
	1 lepton	_	_	_				
$WW \rightarrow \ell \nu qq$ , powheg	1 lepton, from W 1 lepton, from t	_	_	_				
	> 2 leptons							
	$Z \rightarrow \nu \nu$							
	Inclusve	0.91 ± 0.21	$0.50 \pm 0.15$	$0.45 \pm 0.20$				
	1 lepton	$0.91 \pm 0.21$ $0.03 \pm 0.04$	$0.30 \pm 0.13$ $0.08 \pm 0.04$	$0.43 \pm 0.20$ $0.02 \pm 0.02$				
	1 lepton, from W	$0.03 \pm 0.04$ $0.03 \pm 0.04$	$0.08 \pm 0.04$ $0.08 \pm 0.04$	$0.02 \pm 0.02$ $0.02 \pm 0.02$				
WZ	1 lepton, from t	1 0.00 ± 0.01		I 5.02 ± 5.02				
	> 2 leptons	$0.88 \pm 0.20$	$0.42 \pm 0.15$	$0.43 \pm 0.20$				
	$Z \rightarrow \nu \nu$	1 0.00 ± 0.20		I 51.10 ± 51.25				
	Inclusve	0.78 ± 0.20	$0.37 \pm 0.15$	$0.42 \pm 0.20$				
	1 lepton	1 0.70 ± 0.20	- 0.57	0.42 ± 0.20				
	1 lepton, from W	_	_	_				
$WZ \rightarrow 3\ell\nu$ , powheg pythia8	1 lepton, from t	_	_	l —				
	> 2 leptons	$0.78 \pm 0.20$	$0.37 \pm 0.15$	$0.42 \pm 0.20$				
	$Z \rightarrow \nu \nu$			I				
		1	Cor	ntinued on next page				
			001	on new page				

Table 9 – continued from previous page								
	G1 161 11	2jets	2jets	2jets				
Sample	Classification	$modTopness \ge 6.4$ 250 < MET < 350	$modTopness \ge 6.4$ 350 < MET < 450	$modTopness \ge 6.4$ MET > 450				
	Inclusve	$0.11 \pm 0.03$	$0.06 \pm 0.03$	$0.01 \pm 0.01$				
	1 lepton 1 lepton, from W							
$WZ\rightarrow 2\ell 2Q$ , amenlo pythia8	1 lepton, from t	_	_	_				
	> 2 leptons	$0.11 \pm 0.03$	$0.06 \pm 0.03$	$0.01 \pm 0.01$				
	$Z \rightarrow \nu \nu$	_	_	_				
	Inclusve	$0.03 \pm 0.04$	$0.08 \pm 0.04$	$0.02 \pm 0.02$				
	1 lepton	$0.03 \pm 0.04$	$0.08 \pm 0.04$	$0.02 \pm 0.02$				
$WZ \rightarrow \ell \nu 2Q$ , amenlo pythia8	1 lepton, from W	0.03 ± 0.04	$0.08 \pm 0.04$	$0.02 \pm 0.02$				
	1 lepton, from $t$ > 2 leptons		_	_				
	$Z \rightarrow \nu \nu$	_	_	_				
	Inclusve	_	_	_				
	1 lepton	_	_	_				
$WZ \rightarrow 1\ell 3\nu$ , amenlo pythia8	1 lepton, from W	_	_	_				
w z→1€3v, amenio pytinas	1 lepton, from t	_	_	_				
	≥ 2 leptons	_	<del>-</del>	_				
	$Z \rightarrow \nu \nu$ Inclusve	$0.47 \pm 0.04$	0.13 ± 0.02	0.14 ± 0.02				
	1 lepton	0.47 £ 0.04	U.13 £ U.U2	U.14 E U.U2				
	1 lepton, from W	_	_	_				
ZZ	1 lepton, from t	_	_	_				
	≥ 2 leptons	$0.09 \pm 0.03$	_	$0.05 \pm 0.02$				
	$Z \rightarrow \nu \nu$	$0.37 \pm 0.02$	$0.13 \pm 0.01$	$0.09 \pm 0.01$				
	Inclusve	$0.09 \pm 0.03$	_	$0.05 \pm 0.02$				
	1 lepton 1 lepton, from W		_	_				
$ZZ\rightarrow 2\ell 2Q$ , amenlo pythia8	1 lepton, from t							
	> 2 leptons	$0.09 \pm 0.03$	_	$0.05 \pm 0.02$				
	$Z \rightarrow \nu \nu$		_					
	Inclusve	$0.37 \pm 0.02$	$0.13 \pm 0.01$	$0.09 \pm 0.01$				
	1 lepton	_	_	_				
$ZZ\rightarrow 2\ell 2\nu$ , powheg pythia8	1 lepton, from W 1 lepton, from t	_	_	_				
	≥ 2 leptons							
	$Z \rightarrow \nu \nu$	$0.37 \pm 0.02$	$0.13 \pm 0.01$	$0.09 \pm 0.01$				
	Inclusve	_	_	_				
	1 lepton	_	<del>-</del>	_				
$ZZ\rightarrow 2Q2\nu$ , amcolo pythia8	1 lepton, from W	_	_	_				
	1 lepton, from t > 2 leptons							
	$Z \rightarrow \nu \nu$							
	Inclusve	2.83 ± 0.23	$0.55 \pm 0.11$	0.22 ± 0.08				
	1 lepton	$0.00 \pm 0.00$	$0.00 \pm 0.00$	_				
$tar{t}+V$	1 lepton, from W	<u> </u>	<del>-</del>	_				
1 -	1 lepton, from t	0.00 ± 0.00	$0.00 \pm 0.00$					
	≥ 2 leptons	$1.45 \pm 0.23$	$0.24 \pm 0.11$	$0.11 \pm 0.08$				
	$Z \rightarrow \nu \nu$ Inclusve	$1.37 \pm 0.03$ $1.24 \pm 0.23$	$0.32 \pm 0.01$ $0.19 \pm 0.11$	$0.11 \pm 0.01$ $0.09 \pm 0.08$				
	1 lepton	1.24 ± 0.23	U.13 ± U.11	0.09 ± 0.08				
47   187	1 lepton, from W	_	_	_				
$tar{t}+W$	1 lepton, from t	-	_	_				
	≥ 2 leptons	$1.24 \pm 0.23$	$0.19 \pm 0.11$	$0.09 \pm 0.08$				
	$Z \rightarrow \nu \nu$		- 0.10   0.11					
	Inclusve 1 lepton	$1.04 \pm 0.22$	$0.16 \pm 0.11$	0.03 ± 0.07				
	1 lepton 1 lepton, from W							
$t\bar{t} + W \rightarrow \ell\nu$ , amenlo pythia8	1 lepton, from t	_	_	_				
	≥ 2 leptons	$1.04 \pm 0.22$	$0.16 \pm 0.11$	$0.03 \pm 0.07$				
	$Z \rightarrow \nu \nu$	_	_					
			Cor	ntinued on next page				

Table 9 - continued from previous page

Table 9 – continued from previous page							
		2jets	2jets	2jets			
Sample	Classification	modTopness≥ 6.4	modTopness≥ 6.4	modTopness≥ 6.4			
		250 < MET < 350	350 < MET < 450	MET > 450			
	Inclusve	$0.21 \pm 0.07$	$0.03 \pm 0.02$	$0.06 \pm 0.04$			
	1 lepton	0.21 ± 0.01	0.00 ± 0.02	0.00 ± 0.01			
	1 lepton, from W		_	_			
$t\bar{t} + W \rightarrow QQ$ , amenlo pythia8	1 lepton, from t		_				
	> 2 leptons	$0.21 \pm 0.07$	$0.03 \pm 0.02$	$0.06 \pm 0.04$			
	$Z \rightarrow \nu \nu$	0.21 ± 0.01	0.00 ± 0.02				
	Inclusve	$1.59 \pm 0.03$	$0.36 \pm 0.01$	$0.13 \pm 0.01$			
	1 lepton	$0.00 \pm 0.00$	$0.00 \pm 0.00$	0.10 ± 0.01			
$tar{t}+Z$	1 lepton, from W						
tt + Z	1 lepton, from t	$0.00 \pm 0.00$	$0.00 \pm 0.00$				
	> 2 leptons	$0.21 \pm 0.01$	$0.04 \pm 0.01$	$0.02 \pm 0.00$			
	$Z \rightarrow \nu \nu$	$1.37 \pm 0.03$	$0.32 \pm 0.01$	$0.11 \pm 0.01$			
	Inclusve	$1.59 \pm 0.03$	$0.36 \pm 0.01$	$0.13 \pm 0.01$			
	1 lepton	0.00 ± 0.00	$0.00 \pm 0.00$				
	1 lepton, from W						
$t\bar{t} + Z$ , madgraph	1 lepton, from t	$0.00 \pm 0.00$	$0.00 \pm 0.00$	_			
	> 2 leptons	$0.21 \pm 0.01$	$0.04 \pm 0.01$	$0.02 \pm 0.00$			
	$Z \rightarrow \nu \nu$	$1.37 \pm 0.03$	$0.32 \pm 0.01$	$0.11 \pm 0.01$			
	Inclusve	$0.08 \pm 0.08$	$0.00 \pm 0.03$	$0.03 \pm 0.02$			
	1 lepton	_	_	_			
$t\bar{t} + Z \rightarrow QQ$ , amenlo pythia8	1 lepton, from W	_	<u> </u>	_			
$tt + Z \rightarrow QQ$ , amenio pytnias	1 lepton, from $t$	_	_	_			
	≥ 2 leptons	$0.08 \pm 0.08$	$0.00 \pm 0.03$	$0.03 \pm 0.02$			
	$Z \rightarrow \nu \nu$	_	<u> </u>	<u> </u>			
	Inclusve	$1.14 \pm 0.22$	$0.28 \pm 0.11$	$0.16 \pm 0.06$			
	1 lepton	_	<u> </u>	<u> </u>			
$t\bar{t} + Z \rightarrow 2\ell 2\nu$ , amenlo pythia8	1 lepton, from W	_	<u> </u>	-			
tt T 2 - 2020, amenio pytinas	1 lepton, from $t$		<u> </u>	-			
	$\geq$ 2 leptons	$0.48 \pm 0.14$	$0.03 \pm 0.05$	$0.03 \pm 0.02$			
	$Z \rightarrow \nu \nu$	$0.66 \pm 0.17$	$0.25 \pm 0.10$	$0.13 \pm 0.05$			

CR21, Nominal Systematic, Yield Table for Input Samples

ample	CR21, Nominal Systematic, Yield Table for Input Samples								
	Classification	3jets	3jets	3jets	3jets				
	Classification	$MT2W \ge 200$ 250 < MET < 350	$MT2W \ge 200$ 350 < MET < 450	$MT2W \ge 200$ 450 < MET < 550	$MT2W \ge 200$ MET > 550				
/									
ata, single $e/\mu$ , MET	Inclusve	$135.00 \pm 11.62$	$48.00 \pm 6.93$	$18.00 \pm 4.24$	$6.00 \pm 2.45$				
	Inclusve	$169.43 \pm 7.08$	$40.51 \pm 2.46$	$12.83 \pm 4.17$	$5.23 \pm 0.98$				
	1 lepton	$12.38 \pm 1.53$	$3.26 \pm 1.07$	$0.81 \pm 0.20$	$0.70 \pm 0.32$				
ll Background	1 lepton, from W	$3.39 \pm 0.57$	$2.02 \pm 0.99$	$0.48 \pm 0.15$	$0.46 \pm 0.29$				
8	1 lepton, from t	$8.99 \pm 1.42$	$1.24 \pm 0.41$	$0.33 \pm 0.14$	$0.23 \pm 0.15$				
	≥ 2 leptons	$155.55 \pm 6.91$	$36.70 \pm 2.21$	$11.89 \pm 4.17$	$4.45 \pm 0.93$				
	$Z \rightarrow \nu \nu$	$1.50 \pm 0.03$	$0.55 \pm 0.06$	$0.12 \pm 0.01$	$0.08 \pm 0.04$				
	Inclusve 1 lepton	$140.51 \pm 3.46$ $8.96 \pm 1.42$	31.23 ± 1.49	$6.61 \pm 0.63$	$2.55 \pm 0.38$				
	1 lepton 1 lepton, from W	8.96 ± 1.42	$1.23 \pm 0.41$	$0.33 \pm 0.14$	$0.23 \pm 0.15$				
	1 lepton, from t	8.96 ± 1.42	$1.23 \pm 0.41$	$0.33 \pm 0.14$	$0.23 \pm 0.15$				
	> 2 leptons	131.55 ± 3.15	$30.00 \pm 1.43$	$6.28 \pm 0.61$	$2.31 \pm 0.13$				
	$Z \rightarrow \nu \nu$		30.00 ± 1.45	0.20 ± 0.01	2.01 ± 0.04				
	Inclusve	$4.59 \pm 1.28$	$0.48 \pm 0.34$	_	$0.14 \pm 0.14$				
	1 lepton	4.59 ± 1.28	$0.48 \pm 0.34$	_	$0.14 \pm 0.14$				
	1 lepton, from W			_					
, single lepFromT, madgraph pythia8	1 lepton, from t	$4.59 \pm 1.28$	$0.48 \pm 0.34$	<u> </u>	$0.14 \pm 0.14$				
	> 2 leptons	_	_	_	_				
	$Z \rightarrow \nu \nu$	_	-	_	_				
	Inclusve	$4.37 \pm 0.62$	$0.75 \pm 0.22$	$0.33 \pm 0.14$	$0.09 \pm 0.07$				
	1 lepton	$4.37 \pm 0.62$	$0.75 \pm 0.22$	$0.33 \pm 0.14$	$0.09 \pm 0.07$				
, single lepFromTbar, madgraph pythia8, ext1	1 lepton, from W	_	_	_ <del>_</del>	_				
, single lepitomitoar, madgraphi pytmao, exti	1 lepton, from $t$	$4.37 \pm 0.62$	$0.75 \pm 0.22$	$0.33 \pm 0.14$	$0.09 \pm 0.07$				
	≥ 2 leptons	_	_	_	_				
	$Z \rightarrow \nu \nu$								
	Inclusve	$131.55 \pm 3.15$	$30.00 \pm 1.43$	$6.28 \pm 0.61$	$2.31 \pm 0.34$				
	1 lepton	_	_	_	_				
, diLepton, madgraph pythia8, ext1	1 lepton, from W 1 lepton, from t	_	_	_	_				
	> 2 leptons	131.55 ± 3.15	30.00 ± 1.43	$6.28 \pm 0.61$	$2.31 \pm 0.34$				
	$Z \rightarrow \nu \nu$	131.33 ± 3.13	30.00 ± 1.43	0.28 ± 0.01	2.31 ± 0.34				
	Inclusve	$12.42 \pm 2.92$	5.48 ± 1.89	$0.48 \pm 0.48$	$1.38 \pm 0.80$				
	1 lepton		0.97 ± 0.97	U.40 ± U.40	1.55 ± 0.50				
	1 lepton, from W	_	0.97 ± 0.97	_	_				
ngle t	1 lepton, from t	_		<u> </u>	_				
	> 2 leptons	$12.42 \pm 2.92$	$4.50 \pm 1.62$	$0.48 \pm 0.48$	$1.38 \pm 0.80$				
	$Z \rightarrow \nu \nu$	_	_	_	_				
	Inclusve	$12.42 \pm 2.92$	$5.48 \pm 1.89$	$0.48 \pm 0.48$	$1.38 \pm 0.80$				
	1 lepton	_	$0.97 \pm 0.97$	_	_				
ngle t t - W-channel	1 lepton, from W	_	$0.97 \pm 0.97$	_	_				
	1 lepton, from t	l <del>.</del>			<del></del> .				
	≥ 2 leptons	$12.42 \pm 2.92$	$4.50 \pm 1.62$	$0.48 \pm 0.48$	$1.38 \pm 0.80$				
	$Z \rightarrow \nu \nu$	_	_	_					
	Inclusve	_	_	_	_				
	1 lepton	_	_	_	_				
ngle $t$ , $t - W$ -channel, powheg pythia8	1 lepton, from W 1 lepton, from t		_						
	> 2 leptons								
	$Z \rightarrow \nu \nu$								
	Inclusve	12.42 ± 2.92	5.48 ± 1.89	$0.48 \pm 0.48$	$1.38 \pm 0.80$				
	1 lepton	12.72 ± 2.02	$0.97 \pm 0.97$	U.40 ± U.40	- 0.80				
	1 lepton, from W	_	0.97 ± 0.97	_	_				
ngle $\bar{t}$ , $t-W$ -channel, powheg pythia8	1 lepton, from t	_		_	_				
	> 2 leptons	$12.42 \pm 2.92$	$4.50 \pm 1.62$	$0.48 \pm 0.48$	$1.38 \pm 0.80$				
	$Z \rightarrow \nu \nu$								
	Inclusve	_	_	_	_				
			_	_	_				
	1 lepton	_							
agle t non t - W ghannel	1 lepton 1 lepton, from $W$		_	_	_				
ngle $t$ non $t-W$ -channel	1 lepton, from W 1 lepton, from t	_ _ _	_ _	<u> </u>	_ _				
ngle $t$ non $t-W$ -channel	1 lepton, from W		_ _ _	_ _ _	_ _ _				

Table 10 - continued from previous page

Table $10-$ continued from previous page								
		3jets	3jets	3jets	3jets			
Sample	Classification	MT2W≥200	MT2W≥200	MT2W≥200	$MT2W \ge 200$			
		250 < MET < 350	350 < MET < 450	450 < MET < 550	MET > 550			
	Inclusve							
		_	_	_	_			
	1 lepton	_	_	_	_			
single t, s-channel, amcnlo pythia8	1 lepton, from W	_	_	_	_			
	1 lepton, from $t$	_	_	_	_			
	≥ 2 leptons	_	_	_	_			
	$Z \rightarrow \nu \nu$	_	_	<u> </u>	_			
	Inclusve	$8.63 \pm 5.39$	$1.01 \pm 0.19$	$4.54 \pm 4.08$	$0.46 \pm 0.29$			
	1 lepton	$3.27 \pm 0.57$	$1.01 \pm 0.19$	$0.47 \pm 0.15$	$0.46 \pm 0.29$			
	1 lepton, from W	$3.27 \pm 0.57$	$1.01 \pm 0.19$	$0.47 \pm 0.15$	$0.46 \pm 0.29$			
$V + \mathrm{Jets}$	1 lepton, from t							
	> 2 leptons	$5.36 \pm 5.36$		$4.07 \pm 4.07$	_			
	$Z \rightarrow \nu \nu$	_ 0.00 ± 0.00		1.01 ± 1.01	_			
	Inclusve	5.36 ± 5.36		1.07 ± 1.07				
		5.30 ± 5.30	_	$4.07 \pm 4.07$	_			
	1 lepton	_	_	_	_			
$DY+Jets \rightarrow \ell\ell$	1 lepton, from W	_	_	_	_			
	1 lepton, from t	l <del></del>	_	I <del></del>	_			
	≥ 2 leptons	$5.36 \pm 5.36$	_	$4.07 \pm 4.07$	_			
	$Z \rightarrow \nu \nu$							
	Inclusve	_		_				
	1 lepton	_	_	_	_			
D351.7	1 lepton, from W	_	_	_	_			
$DY+Jets \rightarrow \ell\ell$ , M10to50, amcnlo pythia8	1 lepton, from t	_	_	_	_			
	> 2 leptons	_	_	_	_			
	$Z \rightarrow \nu \nu$	_	_	_	_			
	Inclusve	$5.36 \pm 5.36$		$4.07 \pm 4.07$				
	1 lepton	3.30 ± 3.30	_	4.07 ± 4.07	_			
		_	_	_	_			
DY+Jets→ ℓℓ, M50, amcnlo pythia8	1 lepton, from W	_	_	_	_			
,	1 lepton, from $t$		_	<del>-</del>	_			
	$\geq$ 2 leptons	$5.36 \pm 5.36$	_	$4.07 \pm 4.07$	_			
	$Z \rightarrow \nu \nu$	_	_		_			
	Inclusve	$3.27 \pm 0.57$	$1.01 \pm 0.19$	$0.47 \pm 0.15$	$0.46 \pm 0.29$			
	1 lepton	$3.27 \pm 0.57$	$1.01 \pm 0.19$	$0.47 \pm 0.15$	$0.46 \pm 0.29$			
777.1.7	1 lepton, from W	$3.27 \pm 0.57$	$1.01 \pm 0.19$	$0.47 \pm 0.15$	$0.46 \pm 0.29$			
W+Jets $\rightarrow \ell \nu$	1 lepton, from $t$	_	<u> </u>	_	_			
	> 2 leptons	_	_	_	_			
	$Z \rightarrow \nu \nu$		<u> </u>	_	_			
	Inclusve	_	_					
	1 lepton							
	1 lepton, from W	_	_	_				
W+Jets $\rightarrow \ell \nu$ , 100 $< HT < 200$ , madgraph pythia8		_	_	_	_			
	1 lepton, from t	_	_	_	_			
	≥ 2 leptons	_	_	_	_			
	$Z \rightarrow \nu \nu$	_						
	Inclusve	_	_	_	_			
	1 lepton	_	_	_	_			
W+Jets $\rightarrow \ell \nu$ , 200 < HT < 400, madgraph pythia8	1 lepton, from W	_	_	_	_			
w ⊤Jets→ €\nu, 200 < n1 < 400, madgraph pythia8	1 lepton, from $t$	_	_	_	_			
	≥ 2 leptons	_	_	_	_			
	$Z \rightarrow \nu \nu$	_	_	_	_			
	Inclusve	_	_	_	_			
	1 lepton	_	_	_	_			
	1 lepton, from W	_	_	_	_			
W+Jets $\rightarrow \ell \nu$ , 400 $< HT <$ 600, madgraph pythia8	1 lepton, from t	_	_	_	_			
	$\geq 2$ leptons	_	_	_	_			
		_	_	_	_			
	$Z \rightarrow \nu \nu$			_				
	Inclusve	$1.23 \pm 0.36$	$0.14 \pm 0.10$	_	$0.04 \pm 0.04$			
	1 lepton	$1.23 \pm 0.36$	$0.14 \pm 0.10$	_	$0.04 \pm 0.04$			
W+Jets $\rightarrow \ell \nu$ , 600 < HT < 800, madgraph pythia8	1 lepton, from W	$1.23 \pm 0.36$	$0.14 \pm 0.10$	_	$0.04 \pm 0.04$			
** Tucio - cv, ooo < 111 < ooo, maugraph pythiao	1 lepton, from $t$	_	_	_	_			
	≥ 2 leptons	_	_	_	_			
	$Z \rightarrow \nu \nu$	_	_	_	_			
	1			Continue	d on next page			
				Continue	I next page			

Table 10 - continued from previous page

Table $10$ – continued from previous page								
		3jets	3jets	3jets	3jets			
Sample	Classification	MT2W≥200	MT2W≥200	MT2W≥200	$MT2W \ge 200$			
		250 < MET < 350	350 < MET < 450	450 < MET < 550	MET > 550			
	Inclusve	$1.58 \pm 0.23$	$0.87 \pm 0.16$	$0.31 \pm 0.10$	$0.05 \pm 0.02$			
	1 lepton	$1.58 \pm 0.23$	$0.87 \pm 0.16$	$0.31 \pm 0.10$	$0.05 \pm 0.02$			
W+Jets $\rightarrow \ell \nu$ , 800 < HT < 1200, madgraph pythia8	1 lepton, from $W$	$1.58 \pm 0.23$	$0.87 \pm 0.16$	$0.31 \pm 0.10$	$0.05 \pm 0.02$			
Trivette - er, eee ( 111 ( 1200, maagraph pythiae	1 lepton, from $t$	_	_	_	_			
	≥ 2 leptons	_	_	_	_			
	$Z \rightarrow \nu \nu$	<del>_</del>	_	<u> </u>				
	Inclusve	$0.46 \pm 0.37$	_	$0.15 \pm 0.11$	$0.34 \pm 0.28$			
	1 lepton	$0.46 \pm 0.37$	_	$0.15 \pm 0.11$	$0.34 \pm 0.28$			
W+Jets $\rightarrow \ell \nu$ , 1200 < HT < 2500, madgraph pythia8	1 lepton, from W	$0.46 \pm 0.37$	_	$0.15 \pm 0.11$	$0.34 \pm 0.28$			
	1 lepton, from $t$ > 2 leptons		_		_			
	$Z \rightarrow \nu \nu$	<del>_</del>	_	<del>-</del>	_			
	Inclusve		_		$0.04 \pm 0.02$			
	1 lepton	<del>_</del>	_	<del>-</del>	$0.04 \pm 0.02$ $0.04 \pm 0.02$			
	1 lepton from W				$0.04 \pm 0.02$ $0.04 \pm 0.02$			
W+Jets $\rightarrow \ell \nu$ , 2500 $< HT < Inf$ , madgraph pythia8	1 lepton, from t	_	_	_	0.04 ± 0.02			
	> 2 leptons	_	_	<u> </u>	_			
	$Z \rightarrow \nu \nu$	_	_	<u> </u>	_			
	Inclusve	$7.87 \pm 0.81$	$2.80 \pm 0.46$	$1.19 \pm 0.40$	$0.84 \pm 0.33$			
	1 lepton	$0.15 \pm 0.06$	0.05 ± 0.03	$0.02 \pm 0.02$				
D.	1 lepton, from W	$0.12 \pm 0.06$	0.04 ± 0.03	$0.02 \pm 0.02$	_			
Rare	1 lepton, from t	$0.03 \pm 0.01$	0.01 ± 0.00	0.00 ± 0.00	_			
	> 2 leptons	$6.23 \pm 0.80$	$2.19 \pm 0.46$	$1.05 \pm 0.40$	$0.76 \pm 0.33$			
	$Z \rightarrow \nu \nu$	$1.50 \pm 0.03$	$0.55 \pm 0.06$	$0.12 \pm 0.01$	$0.08 \pm 0.04$			
	Inclusve	$4.16 \pm 0.74$	$1.77 \pm 0.43$	$0.96 \pm 0.39$	$0.70 \pm 0.33$			
	1 lepton	$0.12 \pm 0.06$	$0.04 \pm 0.03$	$0.02 \pm 0.02$	_			
diBoson	1 lepton, from W	$0.12 \pm 0.06$	$0.04 \pm 0.03$	$0.02 \pm 0.02$	_			
di Boson	1 lepton, from t	_	_	<u> </u>	_			
	≥ 2 leptons	$3.84 \pm 0.74$	$1.58 \pm 0.43$	$0.91 \pm 0.39$	$0.65 \pm 0.32$			
	$Z \rightarrow \nu \nu$	$0.21 \pm 0.02$	$0.15 \pm 0.06$	$0.03 \pm 0.01$	$0.06 \pm 0.04$			
	Inclusve	$2.64 \pm 0.69$	$1.16 \pm 0.40$	$0.82 \pm 0.39$	$0.49 \pm 0.31$			
	1 lepton	_	_	_	_			
WW	1 lepton, from W	_	_	_	_			
	1 lepton, from t				— — — — — — — — — — — — — — — — — — —			
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	$2.64 \pm 0.69$	$1.16 \pm 0.40$	$0.82 \pm 0.39$	$0.49 \pm 0.31$			
	$Z \rightarrow \nu \nu$ Inclusve	$\frac{-}{2.64 \pm 0.69}$	1.16 ± 0.40	0.82 ± 0.39	0.49 ± 0.31			
	1 lepton	2.04 ± 0.09	1.16 ± 0.40	0.82 ± 0.39	0.49 ± 0.31			
	1 lepton from W							
$WW \rightarrow 2\ell 2\nu$ , powheg	1 lepton, from t							
	> 2 leptons	$2.64 \pm 0.69$	1.16 ± 0.40	$0.82 \pm 0.39$	$0.49 \pm 0.31$			
	$Z \rightarrow \nu \nu$			- 0.02	- 0.55			
	Inclusve	_	_		_			
	1 lepton	_	_	_	_			
******	1 lepton, from W	_	_	_	_			
$WW \rightarrow \ell \nu qq$ , powheg	1 lepton, from t	_	_	_	_			
	≥ 2 leptons	_	_	_	_			
	$Z \rightarrow \nu \nu$	_	_	_	_			
	Inclusve	$1.25 \pm 0.26$	$0.50 \pm 0.15$	$0.11 \pm 0.05$	$0.19 \pm 0.09$			
	1 lepton	$0.12 \pm 0.06$	$0.04 \pm 0.03$	$0.02 \pm 0.02$	_			
WZ	1 lepton, from W	$0.12 \pm 0.06$	$0.04 \pm 0.03$	$0.02 \pm 0.02$	_			
** L	1 lepton, from $t$	<del>-</del>	_	<del>-</del>	_			
	≥ 2 leptons	$1.13 \pm 0.25$	$0.40 \pm 0.14$	$0.09 \pm 0.05$	$0.15 \pm 0.08$			
	$Z \rightarrow \nu \nu$		$0.05 \pm 0.05$	<u> </u>	$0.04 \pm 0.04$			
	Inclusve	$1.06 \pm 0.25$	$0.38 \pm 0.14$	$0.07 \pm 0.05$	$0.14 \pm 0.08$			
	1 lepton	_	_	_	_			
$WZ \rightarrow 3\ell\nu$ , powheg pythia8	1 lepton, from W	_	_	_	_			
, ,	1 lepton, from t	-						
	≥ 2 leptons	$1.06 \pm 0.25$	$0.38 \pm 0.14$	$0.07 \pm 0.05$	$0.14 \pm 0.08$			
	$Z \rightarrow \nu \nu$	_	_					
				Continue	ed on next page			

Table 10 - continued from previous page

$WZ \to 2\ell 2Q, \text{ amenlo pythia8} \qquad \begin{array}{c} & & & & \\ & & 1 \text{ lept} \\ & & \geq \\ & \geq \\ & &$	nclusve lepton on, from $W$ ton, from $W$ ton, from $W$ ton, from $W$ ton, from $W$ lepton on, from $W$ lepton on, from $W$ lepton $W$ lepton $W$ ton, from $W$ lepton on, from $W$ nclusve lepton on, from $W$ nclusve lepton on, from $W$ nclusve lepton on, from $W$	$ \begin{array}{c c} 3 \text{ jets} \\ \text{MT2W} \geq 200 \\ 250 < MET < 350 \\ \hline \\ 0.07 \pm 0.05 \\ \hline \\ - \\ 0.07 \pm 0.05 \\ \hline \\ - \\ 0.12 \pm 0.06 \\ 0.12 \pm 0.06 \\ 0.12 \pm 0.06 \\ \hline \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ -$	$\begin{array}{c c} 3 \text{ jets} \\ \text{MT2W} \geq 200 \\ 350 < MET < 450 \\ \hline \\ 0.02 \pm 0.02 \\ \hline \\$	3jets MT2W≥200 450 < MET < 550  0.02 ± 0.01	3jets MT2W200 MET > 550  0.01 ± 0.01
$WZ \to 2\ell 2Q, \text{ amenlo pythia8} \qquad \begin{array}{c} & \text{I} \\ & 1 \text{ lept} \\ & 2 \\ & 2 \\ & \\ & \\ & \\ & \\ & \\ & \\ &$	nclusve lepton on, from $W$ ton, from $t$ 2 leptons $Z \to \nu \nu$ nclusve lepton on, from $t$ 2 leptons $Z \to \nu \nu$ nclusve lepton on, from $W$ ton, from $W$ ton, from $W$ ton, from $W$ 2 lepton on, from $W$ 2 lepton on, from $W$ 2 lepton on, from $W$ ton, fr	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c c} 450 < ME\overline{T} < 550 \\ \hline 0.02 \pm 0.01 \\ & - \\ \\ 0.02 \pm 0.01 \\ & - \\ \hline 0.02 \pm 0.02 \\ 0.02 \pm 0.02 \\ 0.02 \pm 0.02 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ $	MET > 550  0.01 ± 0.01
$WZ \rightarrow 2\ell 2Q, \text{ amenlo pythia8} \qquad \begin{array}{c} 1 \text{ lept} \\ 2  \\ 2  \\ 3  \\ 4  \\ 4  \\ 5  \\ 2  \\ 4  \\ 5  \\ 2  \\ 4 $	lepton on, from $W$ ton, from $t$ 2 leptons $Z \to \nu \nu$ nclusve lepton lepton $V$ ton, from $V$ ton, from $V$ ton, from $V$ ton, from $V$ lepton on, from $V$ lepton $V$ lepton $V$ leptons $V$ leptons $V$ lepton $V$		$\begin{array}{c} -\\ -\\ -\\ -\\ -\\ 0.02 \pm 0.02 \\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -$	$ \begin{array}{c} -\\ -\\ -\\ -\\ 0.02 \pm 0.01 \\ -\\ 0.02 \pm 0.02 \\ 0.02 \pm 0.02 \\ 0.02 \pm 0.02 \\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -$	$\begin{array}{c} -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ $
$WZ \rightarrow 2\ell 2Q, \text{ amenlo pythia8} \qquad \begin{array}{c} 1 \text{ lept} \\ 2  \\ 2  \\ 3  \\ 4  \\ 4  \\ 5  \\ 2  \\ 4  \\ 5  \\ 2  \\ 4 $	lepton on, from $W$ ton, from $t$ 2 leptons $Z \to \nu \nu$ nclusve lepton lepton $V$ ton, from $V$ ton, from $V$ ton, from $V$ ton, from $V$ lepton on, from $V$ lepton $V$ lepton $V$ leptons $V$ leptons $V$ lepton $V$		$\begin{array}{c} -\\ -\\ -\\ -\\ -\\ 0.02 \pm 0.02 \\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -$	$ \begin{array}{c} -\\ -\\ -\\ -\\ 0.02 \pm 0.01 \\ -\\ 0.02 \pm 0.02 \\ 0.02 \pm 0.02 \\ 0.02 \pm 0.02 \\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -$	$\begin{array}{c} -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ $
$WZ \to 2\ell 2Q$ , amenlo pythia8 $\begin{vmatrix} 1 \text{ lept} \\ 2 \text{ lept} \\ 2  \\ 2  \\ 3  \\ 4  \\ 1  \\ 1  \\ 1  \\ 1  \\ 1  \\ 1  \\ 1  \\ 1  \\ 1  \\ 1  \\ 2  \\ 2  \\ 2  \\ 3  \\ 4  \\ 1  \\ 2  $	on, from $W$ ton, from $t$ 2 leptons $Z \to \nu \nu$ neclusve lepton ion, from $t$ 2 leptons $Z \to \nu \nu$ neclusve lepton ion, from $W$ ton, from $W$ ton, from $W$ lepton ion, from $W$ 2 leptons $Z \to \nu \nu$ neclusve lepton ion, from $W$ ton, from $W$		$ \begin{array}{c} - \\ 0.04 \pm 0.03 \\ 0.04 \pm 0.03 \\ 0.04 \pm 0.03 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ $		$\begin{array}{c} -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ 0.04 \pm 0.04 \\ 0.02 \pm 0.01 \\ -\\ -\\ -\\ -\\ 0.00 \pm 0.01 \end{array}$
$WZ \rightarrow 2\ell 2Q$ , amenio pythias $\begin{vmatrix} 1 & \log z \\ \geq 2 & 1 \\ & 1 & 1 \\ \log z \\ & 2 & 1 \end{vmatrix}$ $WZ \rightarrow \ell \nu 2Q$ , amenio pythias $\begin{vmatrix} 1 & \log z \\ \geq 2 & 1 \\ & 1 & 1 \\ & 1 & 1 \end{vmatrix}$ $WZ \rightarrow 1\ell 3\nu$ , amenio pythias $\begin{vmatrix} 1 & \log z \\ \geq 2 & 1 \\ & 1 & 1 \end{vmatrix}$ $ZZ$ $ZZ$ $ZZ$ $ZZ$ $ZZ$ $ZZ$ $ZZ$ $Z$	ton, from $t$ 2 leptons $Z \to \nu \nu$ nclusve lepton won, from $W$ ton, from $W$ ton, from $W$ ton, from $W$ ton, from $W$ lepton on, from $W$ lepton on, from $W$ lepton on, from $W$ lepton $W$ nclusve lepton on, from $W$ ton, from $W$ ton, from $W$ ton, from $W$ lepton $W$ lepton		$ \begin{array}{c} -\\ 0.04 \pm 0.03 \\ 0.04 \pm 0.03 \\ 0.04 \pm 0.03 \\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -$		$\begin{array}{c} -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ 0.04 \pm 0.04 \\ 0.02 \pm 0.01 \\ -\\ -\\ -\\ -\\ 0.00 \pm 0.01 \end{array}$
$ \begin{array}{c c} & \geq Z \\ & & \text{I} \\ & & 1 \\ &$	2 leptons $Z \to \nu \nu$ nclusve lepton son, from $W$ ton, from $W$ ton, from $W$ ton, from $W$ lepton son, from $W$ ton, from $W$ t		$ \begin{array}{c} -\\ 0.04 \pm 0.03 \\ 0.04 \pm 0.03 \\ 0.04 \pm 0.03 \\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -$		$\begin{array}{c} -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ 0.04 \pm 0.04 \\ 0.02 \pm 0.01 \\ -\\ -\\ -\\ -\\ 0.00 \pm 0.01 \end{array}$
$WZ \rightarrow \ell \nu 2Q$ , amenlo pythia8    1 lept $VZ \rightarrow 1\ell 3\nu$ , amenlo pythia8    1 lept $VZ \rightarrow 1\ell 3\nu$ , amenlo pythia8    1 lept $VZ \rightarrow 1\ell 3\nu$ , amenlo pythia8    1 lept $VZ \rightarrow 1\ell 3\nu$ , amenlo pythia8    1 lept $VZ \rightarrow 1\ell 3\nu$ , amenlo pythia8    1 lept $VZ \rightarrow 2\ell 2Q$ , amenlo pythia8    1 lept $VZ \rightarrow 2\ell 2\nu$ , powheg pythia8    1 lept $VZ \rightarrow 2\ell 2\nu$ , powheg pythia8    1 lept $VZ \rightarrow 2\ell 2\nu$ , powheg pythia8    1 lept $VZ \rightarrow 2\ell 2\nu$ , powheg pythia8    1 lept    1	$\overline{Z} \rightarrow \nu \nu$ nclusve lepton on, from $W$ ton, from $t$ 2 leptons $\overline{Z} \rightarrow \nu \nu$ nclusve lepton on, from $W$ ton, from $W$		$ \begin{array}{c} -\\ 0.04 \pm 0.03 \\ 0.04 \pm 0.03 \\ 0.04 \pm 0.03 \\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -$		$\begin{array}{c} -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ 0.04 \pm 0.04 \\ 0.02 \pm 0.01 \\ -\\ -\\ -\\ -\\ 0.00 \pm 0.01 \end{array}$
$WZ \rightarrow \ell \nu 2Q, \text{ amenlo pythia8} \qquad \begin{array}{c} & \text{I} \\ & \text{lept} \\ & \geq z \\ & \geq z \\ & \\ & Z \\ \\ WZ \rightarrow 1\ell 3\nu, \text{ amenlo pythia8} & \begin{array}{c} & \text{I} \\ & \text{lept} \\ & 1 \\ \\ & 1 \\ & 1 \\ & 1 \\ & 1 \\ \\ & 1 \\ & 1$	nclusve lepton on, from $W$ ton, from $t$ 2 leptons $Z \rightarrow \nu \nu$ nclusve lepton on, from $W$ 2 leptons $Z \rightarrow \nu \nu$ nclusve lepton on, from $W$ ton, lepton only lepton lepton lepton lepton lepton lepton lepton lepton lepton	0.12 ± 0.06 0.12 ± 0.06 ————————————————————————————————————	$\begin{array}{c} 0.04 \pm 0.03 \\ 0.04 \pm 0.03 \\$	0.02 ± 0.02 0.02 ± 0.02 	$\begin{array}{c} -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ 0.04 \pm 0.04 \\ \hline -\\ -\\ 0.02 \pm 0.01 \\ \hline -\\ -\\ -\\ 0.00 \pm 0.01 \end{array}$
$WZ \rightarrow \ell \nu 2Q$ , amenlo pythia8	on, from $W$ toon, from $t$ 2 leptons $Z \to \nu \nu$ nclusve lepton on, from $t$ 2 leptons $Z \to \nu \nu$ nclusve lepton on toon, from $t$ 2 leptons $Z \to \nu \nu$ nclusve lepton $t$ on, from $t$ 2 leptons $t$ 2 lepton lepton from $t$ 2 leptons $t$ 2 leptons $t$ 3 lepton $t$ 4 lepton	0.12 ± 0.06 	0.04 ± 0.03	0.02 ± 0.02 	$\begin{array}{c} -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ 0.04 \pm 0.04 \\ \hline -\\ -\\ 0.02 \pm 0.01 \\ \hline -\\ -\\ -\\ 0.00 \pm 0.01 \end{array}$
$ \begin{array}{c c} WZ \rightarrow \ell \nu 2Q, \text{ amenlo pythias} & 1 \text{ lep} \\ \geq \frac{2}{2} \\ \hline & I \\ WZ \rightarrow 1\ell 3\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ \geq \frac{2}{2} \\ \hline & I \\ & 1 \\ \downarrow 2Z \\ \hline & ZZ \\ \hline & ZZ \\ \hline & ZZ \rightarrow 2\ell 2Q, \text{ amenlo pythia8} & 1 \text{ lept} \\ \geq \frac{2}{2} \\ \hline & I \\ & 1 \\ \downarrow 2Z \\ \hline & ZZ \rightarrow 2\ell 2\nu, \text{ powheg pythia8} & 1 \text{ lept} \\ & 1 \\ \downarrow 2Z \\ \hline & ZZ \rightarrow 2\ell 2\nu, \text{ powheg pythia8} & 1 \text{ lept} \\ & 2Z \\ \hline & I \\ \downarrow 3Z \\ \hline & I \\ \downarrow 3Z \\ \hline & I \\ \downarrow 4Z \\ \hline & I \\ \downarrow 5Z \\ \hline & I$	ton, from $t$ 2 leptons $Z \rightarrow \nu \nu$ nclusve lepton won, from $W$ ton, from $t$ 2 leptons $Z \rightarrow \nu \nu$ nclusve lepton won, from $W$ ton, from $W$ ton, from $t$ 2 leptons $Z \rightarrow \nu \nu$ nclusve lepton lepton $V$ lepton $V$ lepton $V$ lepton $V$ lepton $V$ lepton $V$ lepton lepton lepton	0.27 ± 0.04 0.07 ± 0.04 0.21 ± 0.02	0.05 ± 0.05 		$\begin{array}{c} -\\ -\\ -\\ 0.04 \pm 0.04 \\ \hline 0.02 \pm 0.01 \\ -\\ -\\ 0.00 \pm 0.01 \end{array}$
$ZZ \to 2\ell 2\nu, \text{ powheg pythia8} \qquad \begin{array}{c} 1 \text{ lep} \\ \geq z \\ Z \\ ZZ \\ ZZ \\ ZZ \to 2\ell 2\nu, \text{ powheg pythia8} \\ ZZ \to 2\ell 2\nu, \text{ amenlo pythia8} \\ ZZ \to 2\ell 2\nu, \text{ amenlo pythia8} \\ ZZ \to 2\ell 2\nu, \text{ powheg pythia8} \\ ZZ \to 2\ell 2\nu,  powheg pythi$	2 leptons $Z \to \nu \nu$ neclusve lepton son, from $W$ ton, from $W$ ton, from $W$ ton, from $W$ ton, from $W$ neclusve lepton on, from $W$ ton, from $W$ ton, from $W$ ton, from $W$ ton, from $W$ ten, from $W$ lepton lepton lepton lepton lepton	$\begin{array}{c} -\\ -\\ -\\ 0.07 \pm 0.04\\ 0.21 \pm 0.02 \end{array}$	$\begin{array}{c} -\\ -\\ -\\ 0.05 \pm 0.05 \\ 0.11 \pm 0.02 \\ -\\ -\\ 0.01 \pm 0.02 \\ 0.10 \pm 0.01 \\ \end{array}$		$\begin{array}{c} -\\ -\\ -\\ 0.04 \pm 0.04 \\ \hline 0.02 \pm 0.01 \\ -\\ -\\ 0.00 \pm 0.01 \end{array}$
$WZ \rightarrow 1\ell 3\nu, \text{ amenlo pythia8} \qquad \begin{array}{c} & & & & \\ & 1 & \text{lept} \\ & & 1 & \text{lept} \\ & & & 2 & \\ & & & 1 \\ & & & 1 \\ & & & 1 \\ & & & 1 \\ & & & 1 \\ & & & 1 \\ & & & 1 \\ & & & 1 \\ & & & 1 \\ & & & 1 \\ & & & 1 \\ & & & 1 \\ & & & 1 \\ & & & 1 \\ & & & 1 \\ & & & 1 \\ & & & &$	$Z \rightarrow \nu \nu$ nclusve lepton lepton ton, from $W$ ton, from $W$ ton, from $V$ ton, from $V$ nclusve lepton con, from $V$ ton, from	$\begin{array}{c} -\\ -\\ -\\ 0.07 \pm 0.04\\ 0.21 \pm 0.02 \end{array}$			$\begin{array}{c} -\\ -\\ -\\ 0.04 \pm 0.04 \\ \hline 0.02 \pm 0.01 \\ -\\ -\\ 0.00 \pm 0.01 \end{array}$
$WZ \rightarrow 1\ell 3\nu, \text{ amenlo pythia8} \qquad \begin{array}{c} & \text{I} \\ & 1 \\ \text{lept} \\ & \geq 2 \\ ZZ \\ \\ ZZ \\ \\ ZZ \\ \\ ZZ \\ \\ ZZ \rightarrow 2\ell 2Q, \text{ amenlo pythia8} \\ \\ & ZZ \rightarrow 2\ell 2Q, \text{ amenlo pythia8} \\ \\ & ZZ \rightarrow 2\ell 2\nu, \text{ powheg pythia8} \\ \\ & ZZ \rightarrow 2\ell 2\nu, \text{ powheg pythia8} \\ \\ & ZZ \rightarrow 2\ell 2\nu, \text{ powheg pythia8} \\ \\ & ZZ \rightarrow 2\ell 2\nu, \text{ powheg pythia8} \\ \\ & ZZ \rightarrow 2\ell 2\nu, \text{ powheg pythia8} \\ \\ & ZZ \rightarrow 2\ell 2\nu, \text{ amenlo pythia8} \\ \\ \\ & ZZ \rightarrow 2\ell 2\nu, \text{ amenlo pythia8} \\ \\ \\ & ZZ \rightarrow 2\ell 2\nu, \text{ amenlo pythia8} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	nclusve lepton on, from $W$ ton, from $t$ 2 leptons $Z \to \nu \nu$ nclusve lepton on, from $W$ ton, from $W$ leptons $Z \to \nu \nu$ nclusve lepton	$\begin{array}{c} -\\ -\\ -\\ 0.07 \pm 0.04\\ 0.21 \pm 0.02 \end{array}$			$\begin{array}{c} -\\ -\\ -\\ 0.04 \pm 0.04 \\ \hline 0.02 \pm 0.01 \\ -\\ -\\ 0.00 \pm 0.01 \end{array}$
$WZ \rightarrow 1\ell 3\nu, \text{ amcnlo pythia8} \qquad \begin{array}{c} 1 \text{ lept} \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ $	lepton on, from $W$ ton, from $t$ 2 leptons $Z \to \nu \nu$ nclusve lepton on, from $W$ ton, from $t$ 2 leptons $Z \to \nu \nu$ nclusve nclusve lepton lepton lepton lepton	$\begin{array}{c} -\\ -\\ -\\ 0.07 \pm 0.04\\ 0.21 \pm 0.02 \end{array}$			$\begin{array}{c} -\\ -\\ -\\ 0.04 \pm 0.04 \\ \hline 0.02 \pm 0.01 \\ -\\ -\\ 0.00 \pm 0.01 \end{array}$
$WZ \rightarrow 1\ell 3 \nu$ , amcnlo pythia8	con, from $W$ ton, from $t$ 2 leptons $Z \to \nu \nu$ nclusve lepton con, from $W$ ton, from $t$ 2 leptons $Z \to \nu \nu$ nclusve lepton lepton column from $t$ 2 leptons $L$ to $L$ lepton lepton	$\begin{array}{c} -\\ -\\ -\\ 0.07 \pm 0.04\\ 0.21 \pm 0.02 \end{array}$	$\begin{array}{c} 0.11 \pm 0.02 \\$		$0.02 \pm 0.01$ $  0.00 \pm 0.01$
$ZZ \rightarrow 2\ell 2\nu$ , powheg pythia8 1 lept $ZZ \rightarrow 2Q 2\nu$ , amcnlo pythia8 1 lept $ZZ \rightarrow 2Q 2\nu$ , amcnlo pythia8 1 lept $ZZ \rightarrow 2\ell 2\nu$ , powheg pythia8 1 lept $ZZ \rightarrow 2\ell 2\nu$ , powheg pythia8 1 lept $ZZ \rightarrow 2\ell 2\nu$ , powheg pythia8 1 lept $ZZ \rightarrow 2\ell 2\nu$ , amcnlo pythia8 1 lept $ZZ \rightarrow 2\ell 2\nu$ , amcnlo pythia8 1 lept $ZZ \rightarrow 2\ell 2\nu$ , amcnlo pythia8 1 lept $ZZ \rightarrow 2\ell 2\nu$ , amcnlo pythia8 1 lept $ZZ \rightarrow 2\ell 2\nu$ , amcnlo pythia8 1 lept	ton, from $t$ 2 leptons $T \rightarrow \nu \nu$ nclusve lepton on, from $T \rightarrow \nu \nu$ 2 lepton $T \rightarrow \nu \nu$ nclusve lepton $T \rightarrow \nu \nu$ nclusve lepton	$\begin{array}{c} -\\ -\\ -\\ 0.07 \pm 0.04\\ 0.21 \pm 0.02 \end{array}$	$\begin{array}{c} 0.11 \pm 0.02 \\$		$0.02 \pm 0.01$ $  0.00 \pm 0.01$
ZZ $ZZ$ $ZZ$ $ZZ$ $ZZ$ $ZZ$ $ZZ$ $ZZ$	2 leptons $7 \rightarrow \nu \nu$ Lepton lepton lepton lepton $V$ ton, from $V$ ton, from $V$ ton, from $V$ considerable $V$ co	$\begin{array}{c} -\\ -\\ -\\ 0.07 \pm 0.04\\ 0.21 \pm 0.02 \end{array}$	$\begin{array}{c} 0.11 \pm 0.02 \\$		$0.02 \pm 0.01$ $  0.00 \pm 0.01$
$ZZ$ $ \begin{array}{c} & & & & & & \\ & & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\$	$Z \to \nu \nu$ nclusve lepton ion, from $W$ ton, from $t$ 2 leptons $Z \to \nu \nu$ nclusve lepton	$\begin{array}{c} -\\ -\\ -\\ 0.07 \pm 0.04\\ 0.21 \pm 0.02 \end{array}$	$\begin{array}{c} 0.11 \pm 0.02 \\$		$0.02 \pm 0.01$ $  0.00 \pm 0.01$
$ZZ$ $\begin{array}{c} & \text{I} \\ 1 \text{ lept} \\ 1 \text{ lept} \\ 2 \\ ZZ \\ ZZ \\ 2 \\ ZZ \\ ZZ \\ 2 \\ ZZ \\ 2 \\ ZZ \\ 2 \\ 2$	nclusve lepton on, from $W$ ton, from $t$ 2 leptons $T \to \nu \nu$ nclusve lepton	$\begin{array}{c} -\\ -\\ -\\ 0.07 \pm 0.04\\ 0.21 \pm 0.02 \end{array}$	$\begin{array}{c} 0.11 \pm 0.02 \\$		$0.02 \pm 0.01$ $  0.00 \pm 0.01$
$ZZ$ 1 lept 1 lep 2 $\frac{1}{2}$ $ZZ \to 2\ell 2Q$ , amcnlo pythia8 1 lept 2 $\frac{1}{2}$ $ZZ \to 2\ell 2V$ , powheg pythia8 1 lept 2 $\frac{1}{2}$	telepton length from $W$ ton, from $t$ 2 leptons $Z \rightarrow \nu \nu$ nclusve lepton	$\begin{array}{c} -\\ -\\ -\\ 0.07 \pm 0.04\\ 0.21 \pm 0.02 \end{array}$	$\begin{array}{c} -\\ -\\ -\\ 0.01 \pm 0.02\\ 0.10 \pm 0.01 \end{array}$		
$ZZ$ $1 \text{ lept} 1 \text{ lep} 1$ $2 \text{ lept} 2$ $2 \text{ If } 1$ $1 \text{ lept} 3$ $2 \text{ Z} \rightarrow 2\ell 2Q, \text{ amcnlo pythia8}$ $1 \text{ lept} 3$ $2 \text{ Z} \rightarrow 2\ell 2\nu, \text{ powheg pythia8}$ $1 \text{ lept} 4$ $2 \text{ Z} \rightarrow 2\ell 2\nu, \text{ powheg pythia8}$ $1 \text{ lept} 5$ $2 \text{ Z} \rightarrow 2 \text{ Z} 2 \text{ Q} 2 \nu, \text{ amcnlo pythia8}$ $1 \text{ lept} 1$ $1 \text{ lept} 1$ $1 \text{ lept} 3$ $1 \text{ lept} 4$ $2 \text{ Z} \rightarrow 2 \text{ Q} 2 \nu, \text{ amcnlo pythia8}$ $1 \text{ lept} 3$	ton, from $W$ ton, from $t$ 2 leptons $Z \to \nu \nu$ nclusve lepton	$\begin{array}{c} - \\ 0.07 \pm 0.04 \\ 0.21 \pm 0.02 \end{array}$	$\begin{array}{c} - \\ 0.01 \pm 0.02 \\ 0.10 \pm 0.01 \end{array}$	$-$ 0.01 $\pm$ 0.01	
$ \begin{array}{c c} ZZ \\ & 2\\ \hline \\ ZZ \rightarrow 2\ell 2Q, \text{ amcnlo pythia8} \\ \hline \\ ZZ \rightarrow 2\ell 2Q, \text{ amcnlo pythia8} \\ \hline \\ ZZ \rightarrow 2\ell 2\nu, \text{ powheg pythia8} \\ \hline \\ ZZ \rightarrow 2\ell 2\nu, \text{ powheg pythia8} \\ \hline \\ ZZ \rightarrow 2Q 2\nu, \text{ amcnlo pythia8} \\ \hline \\ ZZ \rightarrow 2Q 2\nu, \text{ amcnlo pythia8} \\ \hline \\ ZZ \rightarrow 2Q 2\nu, \text{ amcnlo pythia8} \\ \hline \\ ZZ \rightarrow 2Q 2\nu, \text{ amcnlo pythia8} \\ \hline \\ ZZ \rightarrow 2Q 2\nu, \text{ amcnlo pythia8} \\ \hline \\ ZZ \rightarrow 2Q 2\nu, \text{ amcnlo pythia8} \\ \hline \\ ZZ \rightarrow 2Q 2\nu, \text{ amcnlo pythia8} \\ \hline \\ ZZ \rightarrow 2Q 2\nu, \text{ amcnlo pythia8} \\ \hline \\ ZZ \rightarrow 2Q 2\nu, \text{ amcnlo pythia8} \\ \hline \\ ZZ \rightarrow 2Q 2\nu, \text{ amcnlo pythia8} \\ \hline \\ ZZ \rightarrow 2Q 2\nu, \text{ amcnlo pythia8} \\ \hline \\ ZZ \rightarrow 2Q 2\nu, \text{ amcnlo pythia8} \\ \hline \\ ZZ \rightarrow 2Q 2\nu, \text{ amcnlo pythia8} \\ \hline \\ ZZ \rightarrow 2Q 2\nu, \text{ amcnlo pythia8} \\ \hline \\ ZZ \rightarrow 2Q 2\nu, \text{ amcnlo pythia8} \\ \hline \\ ZZ \rightarrow 2Q 2\nu, \text{ amcnlo pythia8} \\ \hline \\ ZZ \rightarrow Q 2\nu, \text{ amcnlo pythia9} \\ \hline \\ ZZ \rightarrow Q 2\nu, \text{ amcnlo pythia9} \\ \hline \\ ZZ \rightarrow Q 2\nu, \text{ amcnlo pythia9} \\ \hline \\ ZZ \rightarrow Q 2\nu, \text{ amcnlo pythia9} \\ \hline \\ ZZ \rightarrow Q 2\nu,  amcnlo p$	ton, from $t$ 2 leptons $Z \rightarrow \nu \nu$ nclusve lepton	$\begin{array}{c} - \\ 0.07 \pm 0.04 \\ 0.21 \pm 0.02 \end{array}$	$\begin{array}{c} - \\ 0.01 \pm 0.02 \\ 0.10 \pm 0.01 \end{array}$	$-$ 0.01 $\pm$ 0.01	
$ZZ \rightarrow 2\ell 2Q, \text{ amcnlo pythia8} \qquad \begin{array}{c} \geq Z \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\$	2 leptons $Z \rightarrow \nu\nu$ nclusve lepton	$0.21 \pm 0.02$	$0.10 \pm 0.01$		
$ZZ \rightarrow 2\ell 2Q, \text{ amcnlo pythia8} \qquad \begin{array}{c} & & & & \\ & & & 1 \\ & & & 1 \\ & & & 1 \\ & & & 1 \\ & & & 1 \\ & & & 1 \\ & & & &$	$Z \rightarrow \nu \nu$ nclusve lepton	$0.21 \pm 0.02$	$0.10 \pm 0.01$		
$ZZ \rightarrow 2\ell 2Q, \text{ amcnlo pythia8} \\ \begin{array}{c} 1 \text{ lept} \\ 2 \\ 2 \\ 3 \\ 3 \\ 3 \\ 3 \\ 4 \\ 2 \\ 2 \\ 2 \\ 3 \\ 3 \\ 4 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2$	lepton	0.07 ± 0.04 —			$0.02 \pm 0.01$
$ZZ \rightarrow 2\ell 2Q$ , amenlo pythia8 $ \begin{array}{c} 1 \text{ lept} \\ 1 \text{ lept} \\ \geq \frac{2}{Z} \\ \end{array} $ $ZZ \rightarrow 2\ell 2\nu$ , powheg pythia8 $ \begin{array}{c} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{array} $ $ \begin{array}{c} ZZ \rightarrow 2\ell 2\nu, \text{ powheg pythia8} \\ ZZ \rightarrow 2\ell 2\nu, \text{ amenlo pythia8} \\ \end{array} $		_	$0.01 \pm 0.02$	$0.01 \pm 0.01$	$0.00 \pm 0.01$
$\begin{array}{c c} 2Z\to2\ell2Q, \text{ amenio pythias} & 1 \text{ lep} \\ \geq 2 & I \\ & 1 \\ 1 \text{ lept} \\ & 2Z\to2\ell2\nu, \text{ powheg pythia8} & 1 \text{ lept} \\ \geq 2 & I \\ & 1 \\ 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 1 \text{ lept} \\ & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 1 \text{ lept} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 2Z\to2Q2\nu, \text{ amenlo pythia8} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 2Z\to2Q2\nu, \text{ amenlo pythia8} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 2Z\to2Q2\nu, \text{ amenlo pythia8} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 2Z\to2Q2\nu, \text{ amenlo pythia8} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 2Z\to2Q2\nu, \text{ amenlo pythia8} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 2Z\to2Q2\nu, \text{ amenlo pythia8} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia8} & 2Z\to2Q2\nu, \text{ amenlo pythia8} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia9} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia9} \\ & 2Z\to2Q2\nu, \text{ amenlo pythia9} \\ & 2Z\to2Q2\nu,  amen$	on, from W		_	_	_
$ \begin{array}{c c} & & & 1 \text{ lep} \\ & \geq \frac{2}{Z} \\ & & \text{I} \\ & & 1 \\ & & 1 \\ & & 1 \\ & & 1 \\ & & 1 \\ & & 2 \\ & & & 1 \\ & & 1 \\ & 1 \\ \\ & 1 \\ & 1 \\ \\ & 1 \\ & 1 \\ \\ & 1 \\ \\ & 1 \\ \\ & 1 \\ \\ & 1 \\ \\ & 1 \\ \\ & 1 \\ \\ \\ & 1 \\ \\ \\ & 1 \\ \\ \\ & 1 \\ \\ \\ \\$		_	_	_	_
$ZZ \rightarrow 2\ell 2\nu, \text{ powheg pythia8} \\ \begin{array}{c} I\\ 1 \text{ lept} \\ 1 \text{ lept} \\ \geq \frac{2}{2} \\ I\\ I\\ 1 \\ I\\ I$	ton, from $t$	_	_	_	_
$ZZ \rightarrow 2\ell 2\nu \text{, powheg pythia8} \\ 1 \text{ lept} \\ 1 \text{ lep} \\ \geq \frac{1}{2} \\ ZZ \rightarrow 2Q2\nu \text{, amcnlo pythia8} \\ 1 \text{ lept} \\ 1  $	2 leptons	$0.07 \pm 0.04$	$0.01 \pm 0.02$	$0.01 \pm 0.01$	$0.00 \pm 0.01$
$ZZ  ightarrow 2\ell 2  u$ , powheg pythia8	$Z \rightarrow \nu \nu$	_	_	—	
$ZZ \rightarrow 2\ell 2\nu$ , powheg pythia8	nclusve	$0.21 \pm 0.02$	$0.10 \pm 0.01$	$0.03 \pm 0.01$	$0.02 \pm 0.01$
$ZZ \rightarrow 2\ell 2\nu$ , powneg pythia8 1 lep $\geq \frac{1}{2}$ I $ZZ \rightarrow 2Q2\nu$ , amcnlo pythia8 1 lept 1 lep	lepton	_	_	_	_
ZZ  ightarrow 2Q2  u, amcnlo pythia8 1 lept 1 lept	on, from W	_	_	_	_
	ton, from t	_	_	_	_
$ ZZ \! \rightarrow \! 2Q2\nu, \text{ amcnlo pythia8} $ $ 1 \text{ lept} $ $ 1 \text{ lept} $	2 leptons $Z \rightarrow \nu \nu$	$0.21 \pm 0.02$	0.10 ± 0.01	$0.03 \pm 0.01$	$0.02 \pm 0.01$
$ZZ \! \to \! 2Q2\nu, \text{ amcnlo pythia8} \qquad \qquad \begin{array}{c} 1 \\ 1 \text{ lept} \\ 1 \text{ lep} \end{array}$	nclusve	0.21 ± 0.02	0.10 ± 0.01	0.03 ± 0.01	0.02 ± 0.01
$ZZ \rightarrow 2Q2\nu$ , amcnlo pythia8 1 lept 1 lep	lepton				
$ZZ \rightarrow 2Q2V$ , amenio pytnias	on, from W	_	_	_	_
	ton, from t	_	_	_	_
	2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	nclusve	$3.71 \pm 0.32$	$1.02 \pm 0.17$	$0.23 \pm 0.07$	$0.14 \pm 0.04$
1	lepton	$0.03 \pm 0.01$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	_
	on, from W	_	_	_	_
1 lep	ton, from $t$	$0.03 \pm 0.01$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	<del>-</del>
	2 leptons	$2.39 \pm 0.32$	$0.62 \pm 0.17$	$0.14 \pm 0.07$	$0.11 \pm 0.04$
	$Z \rightarrow \nu \nu$	$1.29 \pm 0.03$	$0.40 \pm 0.02$	$0.09 \pm 0.01$	$0.03 \pm 0.00$
	nclusve	$1.79 \pm 0.31$	$0.48 \pm 0.17$	$0.10 \pm 0.07$	$0.10 \pm 0.04$
	lepton	$0.01 \pm 0.01$	_	_	_
	on, from W		_	_	_
1 lep	ton, from t	$0.01 \pm 0.01$	0.48 ± 0.17	0.10 ± 0.07	- 0.10 ± 0.01
	2 leptons $Z \rightarrow \nu \nu$	$1.78 \pm 0.31$	$0.48 \pm 0.17$	$0.10 \pm 0.07$	$0.10 \pm 0.04$
		1.42 ± 0.30	$0.45 \pm 0.17$	$ 0.02 \pm 0.06$	0.10 ± 0.04
	nclusve	1.42 ± 0.30	0.45 ± 0.17	0.02 ± 0.06	0.10 ± 0.04
1 lent				_	_
	lepton	_	_	_	_
	lepton on, from W			$0.02 \pm 0.06$	$0.10 \pm 0.04$
	lepton on, from $W$ ton, from $t$	$1.42 \pm 0.30$	$0.45 \pm 0.17$		
	lepton on, from W	1.42 ± 0.30	0.45 ± 0.17		

Table 10 - continued from previous page

	Table 10 – cont	Table 10 – continued from previous page						
		3jets	3jets	3jets	3jets			
Sample	Classification	MT2W≥200	MT2W≥200	MT2W≥200	$MT2W \ge 200$			
		250 < MET < 350	350 < MET < 450	450 < MET < 550	MET > 550			
	Inclusve	$0.37 \pm 0.09$	$0.03 \pm 0.05$	$0.07 \pm 0.03$	_			
	1 lepton	0.01 ± 0.01			_			
	1 lepton, from W		_	_	_			
$t\bar{t} + W \rightarrow QQ$ , amenlo pythia8	1 lepton, from t	$0.01 \pm 0.01$	_	_	_			
	> 2 leptons	0.35 ± 0.09	$0.03 \pm 0.05$	$0.07 \pm 0.03$	_			
	$Z \rightarrow \nu \nu$				_			
	Inclusve	$1.92 \pm 0.04$	$0.54 \pm 0.02$	$0.14 \pm 0.01$	$0.04 \pm 0.00$			
	1 lepton	0.02 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	0.01 ± 0.00			
	1 lepton, from W	0.02 ± 0.00	0.01 ± 0.00	0.00 ± 0.00				
$tar{t}+Z$	1 lepton, from t	$0.02 \pm 0.00$	0.01 + 0.00	$0.00 \pm 0.00$				
	> 2 leptons	0.61 ± 0.02	0.13 ± 0.01	$0.04 \pm 0.01$	0.01 + 0.00			
	$Z \rightarrow \nu \nu$	1.29 ± 0.03	$0.40 \pm 0.02$	0.09 ± 0.01	$0.03 \pm 0.00$			
	Inclusve	1.92 ± 0.04	$0.54 \pm 0.02$	$0.14 \pm 0.01$	$0.04 \pm 0.00$			
	1 lepton	0.02 ± 0.00	0.01 ± 0.00	0.00 ± 0.00				
	1 lepton, from W				_			
$t\bar{t} + Z$ , madgraph	1 lepton, from t	$0.02 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	_			
	> 2 leptons	$0.61 \pm 0.02$	$0.13 \pm 0.01$	$0.04 \pm 0.01$	$0.01 \pm 0.00$			
	$Z \rightarrow \nu \nu$	$1.29 \pm 0.03$	$0.40 \pm 0.02$	$0.09 \pm 0.01$	$0.03 \pm 0.00$			
	Inclusve	$0.45 \pm 0.13$	$0.07 \pm 0.05$	$0.08 \pm 0.04$				
	1 lepton				_			
.=. =	1 lepton, from W	_	_	_	_			
$t\bar{t} + Z \rightarrow QQ$ , amenlo pythia8	1 lepton, from t	_	_	_	_			
	> 2 leptons	$0.45 \pm 0.13$	$0.07 \pm 0.05$	$0.08 \pm 0.04$	_			
	$Z \rightarrow \nu \nu$	_	_	_	_			
	Inclusve	$2.18 \pm 0.31$	$0.55 \pm 0.17$	$0.09 \pm 0.07$	$0.13 \pm 0.06$			
	1 lepton	_	_	_	_			
17 1 7 2/2 1 11:0	1 lepton, from W	_	_	_	_			
$t\bar{t} + Z \rightarrow 2\ell 2\nu$ , amenlo pythia8	1 lepton, from t	_	_	_	_			
	> 2 leptons	$1.08 \pm 0.21$	$0.12 \pm 0.08$	_	$0.06 \pm 0.03$			
	$Z \rightarrow \nu \nu$	$1.09 \pm 0.23$	$0.42 \pm 0.14$	$0.09 \pm 0.06$	$0.07 \pm 0.05$			

CR2l, Nominal Systematic, Yield Table for Input Samples

		able for Input Samples		
Sample	Classification	$\geq$ 4jets MT2W< 200 250 < MET < 350	$\geq$ 4 jets MT2W $< 200$ 350 < MET < 450	$\geq$ 4jets MT2W< 200 MET > 450
Data, single $e/\mu$ , MET	Inclusve	399.00 ± 19.97	91.00 ± 9.54	$22.00 \pm 4.69$
All Background	Inclusve 1 lepton 1 lepton, from W 1 lepton, from t $\geq$ 2 leptons $Z \rightarrow \nu \nu$	$\begin{array}{c} 594.79 \pm 6.97 \\ 17.80 \pm 1.88 \\ 2.48 \pm 0.83 \\ 15.32 \pm 1.69 \\ 574.65 \pm 6.71 \\ 2.34 \pm 0.04 \end{array}$	$\begin{array}{c} 109.09 \pm 2.82 \\ 4.54 \pm 0.92 \\ 0.48 \pm 0.18 \\ 4.06 \pm 0.90 \\ 104.09 \pm 2.67 \\ 0.45 \pm 0.02 \end{array}$	$\begin{array}{c} 32.01 \pm 1.40 \\ 1.73 \pm 0.44 \\ 0.12 \pm 0.07 \\ 1.61 \pm 0.44 \\ 30.17 \pm 1.33 \\ 0.11 \pm 0.01 \end{array}$
$tar{t}$	Inclusve 1 lepton 1 lepton, from $W$ 1 lepton, from $t \ge 2$ leptons $Z \to \nu\nu$	$    \begin{array}{c} 575.98 \pm 6.59 \\ 15.23 \pm 1.69 \\$	$ \begin{array}{c} 105.76 \pm 2.75 \\ 4.00 \pm 0.90 \\$	$\begin{array}{c} 30.66 \pm 1.33 \\ 1.61 \pm 0.44 \\$
$tar{t},  ext{ single lepFromT, madgraph pythia8}$	Inclusve 1 lepton 1 lepton, from $W$ 1 lepton, from $t$ $\geq$ 2 leptons $Z \rightarrow \nu \nu$	$7.59 \pm 1.50$ $7.59 \pm 1.50$ $ 7.59 \pm 1.50$ $  -$	$2.16 \pm 0.83$ $2.16 \pm 0.83$ $ 2.16 \pm 0.83$ $ -$	$\begin{array}{c} 0.71 \pm 0.36 \\ 0.71 \pm 0.36 \\$
$t\bar{t},$ single lep FromTbar, madgraph pythia 8, ext1	Inclusve 1 lepton 1 lepton, from W 1 lepton, from t $\geq$ 2 leptons $Z \rightarrow \nu \nu$	$7.63 \pm 0.78$ $7.63 \pm 0.78$ $ 7.63 \pm 0.78$ $  -$	$     \begin{array}{r}       1.84 \pm 0.35 \\       1.84 \pm 0.35 \\                                    $	$\begin{array}{c} 0.90 \pm 0.25 \\ 0.90 \pm 0.25 \\$
$tar{t},$ di Lepton, madgraph pythia 8, ext1	Inclusve 1 lepton 1 lepton, from $W$ 1 lepton, from $t$ $\geq 2$ leptons $Z \rightarrow \nu \nu$	560.75 ± 6.37 — — — 560.75 ± 6.37	$ \begin{array}{c} 101.75 \pm 2.59 \\$	29.05 ± 1.26 ————————————————————————————————————
single $t$	Inclusve 1 lepton 1 lepton, from W 1 lepton, from $t$ $\geq 2$ leptons $Z \rightarrow \nu \nu$	$7.18 \pm 2.12 \\ 0.62 \pm 0.62 \\ 0.62 \pm 0.62 \\$	$0.55 \pm 0.55$	$0.41 \pm 0.41$ $  0.41 \pm 0.41$ $  0.41 \pm 0.41$
single $t$ $t$ — $W$ -channel	Inclusve 1 lepton 1 lepton, from W 1 lepton, from t $\geq$ 2 leptons $Z \rightarrow \nu \nu$	$\begin{array}{c} 7.18 \pm 2.12 \\ 0.62 \pm 0.62 \\ 0.62 \pm 0.62 \\ \hline \\ -6.56 \pm 2.03 \\ \hline \end{array}$	$0.55 \pm 0.55$	$\begin{array}{c} 0.41 \pm 0.41 \\$
single $t,\ t-W$ -channel, powheg pythia8	Inclusve 1 lepton 1 lepton, from $W$ 1 lepton, from $t$ $\geq$ 2 leptons $Z \rightarrow \nu \nu$	— — — —	——————————————————————————————————————	— — — — —
single $ar{t},\ t-W$ -channel, powheg pythia8	Inclusve 1 lepton 1 lepton, from $W$ 1 lepton, from $t$ $\geq$ 2 leptons $Z \rightarrow \nu \nu$	$\begin{array}{c} 7.18 \pm 2.12 \\ 0.62 \pm 0.62 \\ 0.62 \pm 0.62 \\$	$\begin{array}{c} 0.55 \pm 0.55 \\$	0.41 ± 0.41 — — 0.41 ± 0.41
single $t$ non $t-W$ -channel	Inclusve 1 lepton 1 lepton, from $W$ 1 lepton, from $t$ $\geq$ 2 leptons $Z \rightarrow \nu \nu$			

Table 11 - continued from previous page

Table 11 – continued from previous page								
		≥4jets	≥4jets	≥4jets				
Sample	Classification	MT2W< 200	MT2W < 200	MT2W < 200				
		250 < MET < 350	350 < MET < 450	MET > 450				
	Inclusve	_	_	_				
	1 lepton	_	_	_				
	1 lepton, from W	_						
single t, s-channel, amenlo pythia8	1 lepton, from t	_	_	_				
	> 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$	_	_	_				
	Inclusve	$1.74 \pm 0.55$	$0.48 \pm 0.18$	$0.12 \pm 0.07$				
	1 lepton	$1.74 \pm 0.55$	$0.48 \pm 0.18$	$0.12 \pm 0.07$ $0.12 \pm 0.07$				
	1 lepton, from W	$1.74 \pm 0.05$ $1.74 \pm 0.55$	$0.48 \pm 0.18$	$0.12 \pm 0.07$ $0.12 \pm 0.07$				
V + Jets	1 lepton, from t		0.10 ± 0.10	- 0.01				
	> 2 leptons			_				
	$Z \rightarrow \nu \nu$			_				
	Inclusve							
	1 lepton	_	_	_				
	1 lepton, from W	_	_	_				
$DY+Jets \rightarrow \ell\ell$	1 lepton, from t							
	> 2 leptons							
	$Z \rightarrow \nu \nu$							
	$Z \rightarrow \nu\nu$ Inclusve	_						
	1 lepton	_	_	_				
		_	_	_				
DY+Jets→ ℓℓ, M10to50, amcnlo pythia8	1 lepton, from W 1 lepton, from t		_	_				
		_	_	_				
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	_	_	_				
		_						
	Inclusve	_	_	_				
	1 lepton	_	_	_				
DY+Jets→ ℓℓ, M50, amcnlo pythia8	1 lepton, from W	_	_	_				
	1 lepton, from t	_	_	_				
	≥ 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$		_					
	Inclusve	$1.74 \pm 0.55$	$0.48 \pm 0.18$	$0.12 \pm 0.07$				
	1 lepton	$1.74 \pm 0.55$	$0.48 \pm 0.18$	$0.12 \pm 0.07$				
W+Jets $\rightarrow \ell \nu$	1 lepton, from W	$1.74 \pm 0.55$	$0.48 \pm 0.18$	$0.12 \pm 0.07$				
	1 lepton, from t	_	_	_				
	≥ 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$	_		_				
	Inclusve	_	_	_				
	1 lepton	_	_	_				
W+Jets $\rightarrow \ell \nu$ , 100 < HT < 200, madgraph pythia8	1 lepton, from W	_	_	_				
	1 lepton, from t	_	_	_				
	≥ 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$	_		_				
	Inclusve		_	_				
W+Jets $\rightarrow \ell \nu$ , 200 < HT < 400, madgraph pythia8	1 lepton	_	_	_				
. ,	1 lepton 1 lepton, from W		_	_				
	1 lepton 1 lepton, from $W$ 1 lepton, from $t$		_ _ _	_ _ _				
	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \end{array}$		_ _ _	_ _ _ _				
	$egin{array}{ll} 1  ext{ lepton} & 1  ext{ lepton, from } W \ 1  ext{ lepton, from } t \ & \geq 2  ext{ leptons} \ Z  ightarrow  u u u u u u u u u u u u u u u u u u u$	_						
	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \text{Inclusve} \end{array}$	 0.50 ± 0.50		- - - - -				
	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \text{Inclusve} \\ 1 \text{ lepton} \end{array}$	$\begin{array}{c} - \\ 0.50 \pm 0.50 \\ 0.50 \pm 0.50 \end{array}$		— — — — —				
W+1ets $\rightarrow \ell \nu$ , 400 < HT < 600, maderarb pythias	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline 1 \text{ Inclusive} \\ 1 \text{ lepton, from } W \end{array}$	 0.50 ± 0.50						
W+Jets — $\ell\nu,400 < HT < 600,{\rm madgraph}$ pythia 8	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \end{array}$	$\begin{array}{c} - \\ 0.50 \pm 0.50 \\ 0.50 \pm 0.50 \end{array}$						
W+Jets — $\ell\nu,\;400 < HT < 600,\;{\rm madgraph\;pythia8}$	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \text{Inclusve} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \end{array}$	$\begin{array}{c} - \\ 0.50 \pm 0.50 \\ 0.50 \pm 0.50 \end{array}$		— — — — —				
W+Jets $\rightarrow \ell \nu,  400 < HT < 600,  {\rm madgraph  pythia8}$	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ Inclusve \\ 1 \text{ lepton} \\ 1 \text{ lepton from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \end{array}$	$ \begin{array}{c} - \\ 0.50 \pm 0.50 \\ 0.50 \pm 0.50 \\ 0.50 \pm 0.50 \\ - \\ - \\ - \end{array} $		——————————————————————————————————————				
W+Jets — $\ell \nu,  400 < HT < 600,  { m madgraph}$ pythia 8	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \text{Inclusve} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \end{array}$			- - - - - - - - - - - - - - - - - - -				
W+Jets $\rightarrow \ell \nu,400 < HT < 600,{ m madgraph}$ pythia 8	$\begin{array}{c c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \\ Inclusve \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \\ Inclusve \\ 1 \text{ lepton} \end{array}$		- - - - - - - -					
	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \hline \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \hline \text{Inclusve} \\ 1 \text{ lepton, from } W \\ \hline \text{Inclusve} \\ 1 \text{ lepton, from } W \\ \end{array}$							
W+Jets $ o \ell \nu$ , 400 < $HT$ < 600, madgraph pythia8  W+Jets $ o \ell \nu$ , 600 < $HT$ < 800, madgraph pythia8	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \\ Inclusve \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ \hline Z \rightarrow \nu\nu \\ \hline \\ Inclusve \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1  lepto$		- - - - - - - -					
	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \\ Inclusve \\ 1 \text{ lepton} \\ 1 \text{ lepton from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \\ Inclusve \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \end{array}$							
	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \\ Inclusve \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ \hline Z \rightarrow \nu\nu \\ \hline \\ Inclusve \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1  lepto$							

Table 11 – continued from previous page

Table 1	11 - continued from	previous page		
		>4jets	>4jets	>4jets
Sample	Classification	MT2W < 200	MT2W < 200	MT2W < 200
		250 < MET < 350	350 < MET < 450	MET > 450
	1	230 \ ME1 \ 330	330 C ME1 C 430	ME1 > 430
	Inclusve	$0.81 \pm 0.14$	$0.14 \pm 0.06$	$0.05 \pm 0.03$
	1 lepton	$0.81 \pm 0.14$	$0.14 \pm 0.06$	$0.05 \pm 0.03$
	1 lepton, from W	$0.81 \pm 0.14$	$0.14 \pm 0.06$	0.05 ± 0.03
W+Jets $\rightarrow \ell \nu$ , 800 $< HT < 1200$ , madgraph pythia8		0.81 ± 0.14	0.14 ± 0.06	0.05 ± 0.05
	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	_	$0.34 \pm 0.17$	$0.07 \pm 0.07$
	1 lepton		$0.34 \pm 0.17$	$0.07 \pm 0.07$
W+Jets $\rightarrow \ell \nu$ , 1200 $< HT < 2500$ , madgraph pythia8	1 lepton, from W	_	$0.34 \pm 0.17$	$0.07 \pm 0.07$
	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$0.01 \pm 0.00$	_	_
	1 lepton	$0.01 \pm 0.00$		
W+Jets $\rightarrow \ell \nu$ , 2500 $< HT < Inf$ , madgraph pythia8	1 lepton, from W	$0.01 \pm 0.00$	_	_
,,,,,,	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$9.89 \pm 0.64$	2.30 ± 0.29	$0.82 \pm 0.15$
	1 lepton	$0.21 \pm 0.07$	$0.06 \pm 0.03$	$0.00 \pm 0.02$
			0.00 ± 0.03	0.00 ± 0.02
Rare	1 lepton, from W	$0.12 \pm 0.05$		
	1 lepton, from t	$0.09 \pm 0.04$	$0.06 \pm 0.03$	$0.00 \pm 0.02$
	≥ 2 leptons	$7.34 \pm 0.63$	$1.79 \pm 0.29$	$0.71 \pm 0.15$
	$Z \rightarrow \nu \nu$	$2.34 \pm 0.04$	$0.45 \pm 0.02$	$0.11 \pm 0.01$
	Inclusve	$1.66 \pm 0.37$	$0.35 \pm 0.15$	$0.09 \pm 0.05$
	1 lepton	$0.08 \pm 0.04$	0.00 ± 0.10	0.00 ± 0.00
				_
diBoson	1 lepton, from W	$0.08 \pm 0.04$	_	_
	1 lepton, from t	_	_	_
	≥ 2 leptons	$1.52 \pm 0.36$	$0.34 \pm 0.15$	$0.08 \pm 0.05$
	$Z \rightarrow \nu \nu$	$0.07 \pm 0.01$	$0.02 \pm 0.00$	$0.01 \pm 0.00$
	Inclusve	$0.87 \pm 0.31$	$0.18 \pm 0.13$	
	1 lepton	0.01 ± 0.01	0.10 ± 0.10	
		_	_	_
WW	1 lepton, from W	_	_	_
" "	1 lepton, from t	_	_	_
	> 2 leptons	$0.87 \pm 0.31$	$0.18 \pm 0.13$	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$0.87 \pm 0.31$	$0.18 \pm 0.13$	
	1 lepton	0.07 ± 0.01	0.10 ± 0.10	
		_	_	_
$WW \rightarrow 2\ell 2\nu$ , powheg	1 lepton, from W	_	_	_
, r	1 lepton, from t	_	_	_
	≥ 2 leptons	$0.87 \pm 0.31$	$0.18 \pm 0.13$	_
	$Z \rightarrow \nu \nu$	_	_	l –
	Inclusve	_	_	_
	1 lepton			
		_	_	_
$WW \rightarrow \ell \nu qq$ , powheg	1 lepton, from W	_	_	_
11/ F	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	$0.67 \pm 0.19$	$0.15 \pm 0.08$	$0.08 \pm 0.05$
	1 lepton	$0.08 \pm 0.04$	0.10 ± 0.00	
W Z			_	_
	1 lepton, from W	$0.08 \pm 0.04$	_	_
	1 lepton, from t	_	_	_
	≥ 2 leptons	$0.59 \pm 0.18$	$0.15 \pm 0.08$	$0.08 \pm 0.05$
	$Z \rightarrow \nu \nu$	_	_	l –
	Inclusve	$0.57 \pm 0.18$	$0.13 \pm 0.08$	$0.07 \pm 0.05$
	1 lepton	0.01 ± 0.10	0.10 ± 0.00	
	1 lepton, from W	_	_	
$WZ \rightarrow 3\ell\nu$ , powheg pythia8		_	_	_
0 **	1 lepton, from t	I	<del>.</del>	
	≥ 2 leptons	$0.57 \pm 0.18$	$0.13 \pm 0.08$	$0.07 \pm 0.05$
	$Z \rightarrow \nu \nu$	_	_	_
			Continu	ed on next page
			Commin	more publ

Table 11	- continued	from	previous page	

	Table 11 – continued from previous page									
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$										
$WZ \rightarrow 2\ell 2Q, \text{ amenlo pythia8} \qquad \begin{array}{ c c c c c }\hline & \text{Incluser} \\ & 1 \text{ lepton} \\ & 1 \text{ lepton} \\ & 1 \text{ lepton} \\ & 2 \text{ leptons} \\ & & & & & & & & & & & & & & & & & & $	Sample	Classification								
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			$0.03 \pm 0.02$	$0.02 \pm 0.02$	$0.01 \pm 0.01$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$WZ \rightarrow 2\ell 2Q$ , amenlo pythia8		_	_	_					
	= ===•, FJ									
$WZ \rightarrow \ell \nu 2Q, \text{ amenlo pythia8} \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$			0.03 ± 0.02	$0.02 \pm 0.02$	0.01 ± 0.01					
$ VZ \rightarrow \ell \nu 2Q, \text{ amenlo pythia8} \\  \begin{array}{c} 1 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2  lepton$				_	_					
$WZ \to \ell \nu 2Q, \text{ amenlo pythia8} \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$				_	_					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				_	_					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$WZ \rightarrow \ell \nu 2Q$ , amenlo pythia8		0.08 ± 0.04							
$WZ \to 1l3\nu, \text{ amenlo pythia8} \qquad \begin{array}{ c c c c c }\hline Z = \nu\nu & - & - & - & - & - & - & - & - & - $										
$WZ \to 1\ell 3\nu, \text{ amenlo pythia8} \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$					_					
			_	_	_					
$WZ \to 1\ell 3\nu, \ {\rm amcnlo\ pythia8} \qquad \begin{array}{c} 1 \ \ {\rm lepton, \ from\ } \ \ \\ 2 \ \ {\rm leptons} \ \ \\ Z \to \nu \nu \\ \\ ZZ \\ \\ ZZ$			_		_					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	W. 7 440		_	_	_					
$Z = \frac{1}{\nu \nu} \qquad - \qquad $	$WZ \rightarrow 1\ell 3\nu$ , amenio pythia8	1 lepton, from t	_	_	_					
$ZZ = \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_					
				<u> </u>						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			$0.12 \pm 0.02$	$0.02 \pm 0.01$	$0.01 \pm 0.00$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	ZZ		_	_	_					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					_					
$ZZ \to 2\ell 2Q, \text{ amenlo pythia8} \\ \begin{array}{c} & \text{Incluse} \\ 1 \text{ lepton}, \text{ from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ Z \to \nu \nu \\ & 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ 2 \text{ leptons} \\ 2 \text{ leptons} \\ 2 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ 2 \text{ leptons} \\ 2 \text{ leptons} \\ 2 \text{ lepton} \\ 3 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ $					0.01   0.00					
$ ZZ \rightarrow 2\ell 2Q, \text{ amenlo pythia8} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \\ ZZ \rightarrow 2\ell 2\nu, \text{ powheg pythia8} \\ \end{array} \\ \begin{array}{c} I \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ 1 \text{ lepton} \\ 1 \text{ lepton} \\ 1 \text{ lepton from } W \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\$					0.01 ± 0.00					
$ ZZ \rightarrow 2\ell 2Q, \text{ amenlo pythia8} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \\ & 1 \text{ lepton, from } V \\ \\ & 1 \text{ lepton, from } V \\ \\ & 1 \text{ lepton } V \\ \\ & 1 \text{ lepton, from } V \\ \\ & 1 \text{ lepton, from } V \\ \\ & 1 \text{ lepton, from } V \\ \\ & 1 \text{ lepton, from } V \\ \\ & 1 \text{ lepton, from } V \\ \\ & 1 \text{ lepton, from } V \\ \\ & 2 \text{ leptons} \\ \\ & Z \rightarrow \nu \nu \\ \\ & 1 \text{ lepton } V \\ \\ \\ & 1 \text{ lepton } V \\ \\ \\ & 1 \text{ lepton } V \\$			0.06 ± 0.02	0.01 ± 0.01						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$										
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ZZ\rightarrow 2\ell 2Q$ , amenlo pythia8									
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			$0.06 \pm 0.02$	$0.01 \pm 0.01$	_					
$ZZ \rightarrow 2\ell 2\nu \text{, powheg pythia8} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \end{array} \\ \begin{array}{c} Z \rightarrow \nu \nu \\ \end{array} \\ 0.07 \pm 0.01 \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\$					_					
$ZZ \rightarrow 2\ell 2\nu \text{, powheg pythia8} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \end{array} \\ \begin{array}{c} Z \rightarrow \nu \nu \\ \end{array} \\ 0.07 \pm 0.01 \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\$		Inclusve	$0.07 \pm 0.01$	$0.02 \pm 0.00$	$0.01 \pm 0.00$					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		1 lepton	_	_	_					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	77 . 2/2	1 lepton, from W	_	_	<u> </u>					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ZZ \rightarrow Z\ell Z\nu$ , powneg pytmas	1 lepton, from t	_	_	_					
$ZZ \rightarrow 2Q^2\nu, \text{ amenlo pythia8} \\ \begin{array}{c} & \text{Inclusve} \\ 1 \text{ lepton, from } W \\ & 2 \text{ 2 leptons} \\ & Z \rightarrow \nu\nu \\ \\ \hline t\bar{t} + V \\ \\ & & & & & & & & & & & & & & & & &$			_	<del>-</del>	ļ —					
$ ZZ \rightarrow 2Q2\nu, \text{ amenlo pythia8} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \\ t\bar{t} + V \\ \\ 1 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ lepton, from }$			$0.07 \pm 0.01$	$0.02 \pm 0.00$	$0.01 \pm 0.00$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ZZ\rightarrow 2Q2\nu$ , amcnlo pythia8		_	_	_					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_					
$t\bar{t} + V \qquad \begin{array}{c} \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton}, \text{ from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ 2 leptons} \\ 2 - \nu \nu \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ 2 leptons} \\ 2 - \nu \nu \\ 1 \text{ lepton, from } W \\ 2 \text{ 2 leptons} \\ 2 - \nu \nu \\ 2 \text{ 2 leptons} \\ 1 \text{ lepton, from } W \\ 2 \text{ 2 leptons} \\ 2 - \nu \nu \\ 2 \text{ 2 lepton} \\ 1 \text{ lepton, from } W \\ 2 \text{ 2 leptons} \\ 2 - \nu \nu \\ 2 \text{ 2 leptons} \\ 2 \text{ 3 lepton} \\ 2 \text{ 3 lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ 2 lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ 2 lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ 2 lepton, from } W \\ 2  2 l$										
$t\bar{t} + V \qquad \begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ t\bar{t} + W \qquad \begin{array}{c} 1 \text{ lepton, from } t \\ 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \end{array} \qquad \begin{array}{c} 0.06 \pm 0.03 \\ 0.00 \pm 0.03 \\ 0.01 \pm 0.02 \\ 0.01 \pm 0.02 \\ 0.01 \pm 0.02 \\ 0.00 \pm 0.03 \\ 0.00 \pm 0.03 \\ 0.01 \pm 0.02 \\ 0.00 \pm 0.03 \\ $			8.23 ± 0.52	$1.94 \pm 0.25$	$0.73 \pm 0.14$					
$t\bar{t} + V \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 2 \text{ leptons} \\ 2 - \nu \nu \\ 1 \text{ lepton, from } V \\ 2.27 \pm 0.04 \\ 1 \text{ lepton, from } V \\ 1 \text{ lepton, from } W \\ 2.27 \pm 0.04 \\ 1 \text{ lepton, from } V \\ 2 \text{ lepton, from } V \\ 1 \text{ lepton, from } V \\ 2 \text{ lepton, from } V \\ 1 \text{ lepton, from } V \\ 2 \text{ lepton, from } V \\ 2 \text{ lepton} V \\ 2 \text{ lepton, from } V \\ 2  lepton, fr$					$0.73 \pm 0.14$ $0.00 \pm 0.02$					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	4E 1 **									
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	tt + V			$0.06 \pm 0.03$	$0.00 \pm 0.02$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					$0.63 \pm 0.14$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				$0.43 \pm 0.02$	$0.10 \pm 0.01$					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					$0.60 \pm 0.14$					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				$0.05 \pm 0.03$	-					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$t\bar{t}+W$			<del>-</del>	_					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\iota\iota \iota + vv$									
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			$4.86 \pm 0.52$	$1.30 \pm 0.25$	$0.60 \pm 0.14$					
$t\bar{t} + W \rightarrow \ell \nu \text{, amcnlo pythia8} \\ \begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \end{array} \\ \begin{array}{c} 0.04 \pm 0.03 \\ -0.04 \pm 0$					-					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				$0.92 \pm 0.22$	$0.36 \pm 0.11$					
1 lepton, from $t$ $         -$										
$\geq$ 2 leptons 3.14 ± 0.45 0.92 ± 0.22 0.36 ± 0.1	$t\bar{t} + W \rightarrow \ell\nu$ , amenlo pythia8		0.04 ± 0.03							
			3 14 + 0 45	0.92 ± 0.22	0.36 ± 0.11					
			- 0.40	0.02 ± 0.22	- 0.11					
Continued on next pa				Continu	ed on next page					

Table 11 - continued from previous page

Table 11 – continued from previous page							
Sample	Classification	$\geq$ 4jets MT2W< 200 250 < MET < 350	$\geq$ 4jets MT2W< 200 350 < MET < 450	≥4jets MT2W< 200 MET > 450			
	Inclusve	$1.78 \pm 0.25$	$0.42 \pm 0.13$	$0.24 \pm 0.08$			
				0.24 ± 0.08			
	1 lepton	$0.06 \pm 0.04$	$0.05 \pm 0.03$	_			
$t\bar{t} + W \rightarrow QQ$ , amenlo pythia8	1 lepton, from W			_			
***	1 lepton, from t	$0.06 \pm 0.04$	$0.05 \pm 0.03$				
	≥ 2 leptons	$1.72 \pm 0.25$	$0.38 \pm 0.13$	$0.24 \pm 0.08$			
	$Z \rightarrow \nu \nu$	_	_	_			
	Inclusve	$3.27 \pm 0.05$	$0.60 \pm 0.02$	$0.13 \pm 0.01$			
	1 lepton	$0.03 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$			
$tar{t}+Z$	1 lepton, from W	_	_	_			
	1 lepton, from t	$0.03 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$			
	≥ 2 leptons	$0.96 \pm 0.03$	$0.16 \pm 0.01$	$0.03 \pm 0.00$			
	$Z \rightarrow \nu \nu$	$2.27 \pm 0.04$	$0.43 \pm 0.02$	$0.10 \pm 0.01$			
	Inclusve	$3.27 \pm 0.05$	$0.60 \pm 0.02$	$0.13 \pm 0.01$			
	1 lepton	$0.03 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$			
$t\bar{t} + Z$ , madgraph	1 lepton, from W	_	_	_			
tt + Z, madgraph	1 lepton, from t	$0.03 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$			
	> 2 leptons	$0.96 \pm 0.03$	$0.16 \pm 0.01$	$0.03 \pm 0.00$			
	$Z \rightarrow \nu \nu$	$2.27 \pm 0.04$	$0.43 \pm 0.02$	$0.10 \pm 0.01$			
	Inclusve	$2.18 \pm 0.39$	$0.33 \pm 0.16$	$0.30 \pm 0.08$			
	1 lepton	$0.13 \pm 0.08$	$0.03 \pm 0.03$				
15 1 7 00 1 11:0	1 lepton, from W	_	_	_			
$t\bar{t} + Z \rightarrow QQ$ , amenlo pythia8	1 lepton, from t	$0.13 \pm 0.08$	$0.03 \pm 0.03$	_			
	> 2 leptons	$2.04 \pm 0.38$	$0.30 \pm 0.16$	$0.30 \pm 0.08$			
	$Z \rightarrow \nu \nu$	_	_	_			
	Inclusve	$2.16 \pm 0.45$	$0.88 \pm 0.19$	$0.19 \pm 0.10$			
	1 lepton	_	_	_			
L.E. 7 040 1 11 0	1 lepton, from W	_	_	_			
$t\bar{t} + Z \rightarrow 2\ell 2\nu$ , amcnlo pythia8	1 lepton, from t	_	_	_			
	> 2 leptons	$1.56 \pm 0.39$	$0.63 \pm 0.13$	$0.19 \pm 0.08$			
	$Z \rightarrow \nu \nu$	$0.60 \pm 0.23$	$0.25 \pm 0.14$				

CR2l, Nominal Systematic, Yield Table for Input Samples

	CR21, Nomi		able for Input Samples			
~ .		≥4jets	≥4jets	≥4jets	≥4jets	$\geq$ 4jets
Sample	Classification	MT2W≥ 200	MT2W≥ 200	MT2W≥ 200	MT2W≥ 200	$MT2W \ge 200$
		250 < MET < 350	350 < MET < 450	450 < MET < 550	550 < MET < 650	MET > 650
Data, single $e/\mu$ , MET	Inclusve	$132.00 \pm 11.49$	$37.00 \pm 6.08$	$14.00 \pm 3.74$	$3.00 \pm 1.73$	$3.00 \pm 1.73$
	Inclusve	$178.46 \pm 10.59$	$54.33 \pm 5.35$	16.78 ± 1.28	$7.82 \pm 1.37$	$3.04 \pm 0.52$
	1 lepton	19.44 ± 1.89	7.23 ± 1.25	2.44 ± 0.48	$1.72 \pm 0.63$	$0.55 \pm 0.28$
	1 lepton, from W	3.69 ± 0.79	$2.10 \pm 0.76$	$0.41 \pm 0.12$	$0.97 \pm 0.51$	$0.38 \pm 0.25$
All Background	1 lepton, from t	15.76 ± 1.72	$5.13 \pm 0.98$	2.03 ± 0.46	$0.75 \pm 0.37$	$0.18 \pm 0.13$
	> 2 leptons	157.85 ± 10.42	$46.76 \pm 5.20$	14.19 ± 1.19	$6.06 \pm 1.22$	$2.42 \pm 0.44$
	$Z \rightarrow \nu \nu$	1.17 ± 0.06	$0.34 \pm 0.02$	0.15 ± 0.05	$0.04 \pm 0.01$	$0.06 \pm 0.04$
	Inclusve	$157.90 \pm 4.13$	$44.51 \pm 1.99$	$15.52 \pm 1.25$	$4.21 \pm 0.64$	$1.99 \pm 0.36$
	1 lepton	157.50 ± 4.15	5.11 ± 0.98	1.99 ± 0.46	$0.75 \pm 0.37$	$0.18 \pm 0.13$
	1 lepton, from W	10	0.11 ± 0.00	1.00 ± 0.10		- 0.10
$tar{t}$	1 lepton, from t	15.71 ± 1.71	$5.11 \pm 0.98$	$1.99 \pm 0.46$	$0.75 \pm 0.37$	$0.18 \pm 0.13$
	> 2 leptons	142.18 ± 3.75	39.40 ± 1.73	13.53 ± 1.16	$3.47 \pm 0.52$	$1.81 \pm 0.33$
	$Z \rightarrow \nu \nu$	112:10 ± 0:10		10.00 ± 1.10	0.17 ± 0.02	
	Inclusve	$7.64 \pm 1.52$	$2.36 \pm 0.88$	$0.87 \pm 0.39$	$0.51 \pm 0.36$	$0.11 \pm 0.11$
	1 lepton	$7.64 \pm 1.52$ $7.64 \pm 1.52$	2.36 ± 0.88	0.87 ± 0.39	$0.51 \pm 0.36$ $0.51 \pm 0.36$	$0.11 \pm 0.11$ $0.11 \pm 0.11$
	1 lepton, from W	7.04 ± 1.02	2.50 ± 0.66	0.07 ± 0.03	0.51 ± 0.50	0.11 ± 0.11
$t\bar{t}$ , single lepFromT, madgraph pythia8	1 lepton, from t	$7.64 \pm 1.52$	$2.36 \pm 0.88$	$0.87 \pm 0.39$	$0.51 \pm 0.36$	$0.11 \pm 0.11$
	> 2 leptons	7.04 ± 1.02	2.50 ± 0.66	0.07 ± 0.03	0.51 ± 0.50	U.11 ± U.11
	$Z \rightarrow \nu \nu$					_
	Inclusve	8.07 ± 0.79	$2.74 \pm 0.43$	1.12 ± 0.24	$0.24 \pm 0.11$	$0.07 \pm 0.07$
	1 lepton	8.07 ± 0.79 8.07 ± 0.79	$2.74 \pm 0.43$ $2.74 \pm 0.43$	$1.12 \pm 0.24$ $1.12 \pm 0.24$	$0.24 \pm 0.11$ $0.24 \pm 0.11$	$0.07 \pm 0.07$ $0.07 \pm 0.07$
	1 lepton, from W	8.07 ± 0.79	2.74 ± 0.43	1.12 ± 0.24	0.24 ± 0.11	0.07 ± 0.07
$t\bar{t}$ , single lepFromTbar, madgraph pythia8, ext1	1 lepton, from t	8.07 ± 0.79	$2.74 \pm 0.43$	1.12 ± 0.24	$0.24 \pm 0.11$	$0.07 \pm 0.07$
	> 2 leptons	8.07 ± 0.79	2.74 ± 0.43	1.12 ± 0.24	0.24 ± 0.11	0.07 ± 0.07
	$Z \rightarrow \nu \nu$	_	<del>-</del>	_	_	
	Inclusve	$142.18 \pm 3.75$	$39.40 \pm 1.73$	13.53 ± 1.16	$3.47 \pm 0.52$	1.81 ± 0.33
	1 lepton	142.16 ± 3.75	39.40 ± 1.73	13.33 ± 1.10	3.47 ± 0.32	1.81 ± 0.33
	1 lepton from W	_	<del>-</del>		_	_
$t\bar{t}$ , diLepton, madgraph pythia8, ext1	1 lepton, from t	_	<del>_</del>	_	_	
	> 2 leptons	$142.18 \pm 3.75$	$39.40 \pm 1.73$	13.53 ± 1.16	$3.47 \pm 0.52$	$1.81 \pm 0.33$
	$Z \rightarrow \nu \nu$	142.16 ± 3.75	39.40 ± 1.73	13.33 ± 1.10	3.47 ± 0.32	1.61 ± 0.33
	Inclusve	9.08 ± 2.40	$3.69 \pm 1.54$	_	$2.55 \pm 1.16$	
	1 lepton	9.08 1 2.40	3.09 1 1.04	_	0.39 + 0.39	_
	1 lepton, from W	_	<del>_</del>		0.39 ± 0.39	_
single t	1 lepton, from t				0.55 ± 0.55	_
	> 2 leptons	9.08 ± 2.40	$3.69 \pm 1.54$	_	$2.16 \pm 1.09$	_
	$Z \rightarrow \nu \nu$	3.00 ± 2.40	3.03 ± 1.04		2.10 ± 1.03	_
	Inclusve	9.08 ± 2.40	$3.69 \pm 1.54$	_	$2.55 \pm 1.16$	_
	1 lepton	3.00 ± 2.40	0.00 ± 1.04		0.39 ± 0.39	_
	1 lepton, from W		_		$0.39 \pm 0.39$	_
single $t \ t - W$ -channel	1 lepton, from t	_	_		0.39 ± 0.39	_
	> 2 leptons	9.08 ± 2.40	$3.69 \pm 1.54$		2.16 ± 1.09	
	$Z \rightarrow \nu \nu$	9.08 ± 2.40	3.09 ± 1.54		2.10 ± 1.09	
	Inclusve	<del> </del>	_	_	_	
	1 lepton					
	1 lepton, from W					
single $t$ , $t - W$ -channel, powheg pythia8	1 lepton, from t	_	_	_	_	_
	> 2 leptons	_	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_	_
	Inclusve	9.08 ± 2.40	$3.69 \pm 1.54$	_	$2.55 \pm 1.16$	_
	1 lepton	1 2.40			$0.39 \pm 0.39$	
	1 lepton, from W	_	_		0.39 ± 0.39	_
single $\bar{t},\ t-W$ -channel, powheg pythia8	1 lepton, from t	_	_	_	- 0.00	_
	> 2 leptons	9.08 ± 2.40	$3.69 \pm 1.54$		2.16 ± 1.09	_
	$Z \rightarrow \nu \nu$	1 2.40		_	2.10 ± 1.00	_
	Inclusve					
	1 lepton					
	1 lepton, from W					
single $t$ non $t - W$ -channel	1 lepton, from t					
single $t$ non $t - W$ -channel	r repron, nom t	_	_	_	_	_
-	> 2 leptors	_		_		
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$			_	_	

Table 12 – continued from previous page								
		≥4jets	≥4jets	≥4jets	≥4jets	≥4jets		
Sample	Classification	MT2W≥ 200	MT2W≥ 200	MT2W≥ 200	$MT2W \ge 200$	$MT2W \ge 200$		
		250 < MET < 350	350 < MET < 450	450 < MET < 550	550 < MET < 650	MET > 650		
	Inclusve	_			_			
	1 lepton	_	_			_		
	1 lepton 1 lepton, from W	_	_	_	_			
single t, s-channel, amcnlo pythia8		_	_	_	_	_		
	1 lepton, from t	_	_	_	_	_		
	≥ 2 leptons	_	_	_	_	_		
	$Z \rightarrow \nu \nu$		<u> </u>	_		_		
	Inclusve	$3.53 \pm 9.43$	$2.04 \pm 4.69$	$0.36 \pm 0.12$	$0.53 \pm 0.32$	$0.38 \pm 0.25$		
	1 lepton	$3.53 \pm 0.79$	$2.04 \pm 0.76$	$0.36 \pm 0.12$	$0.53 \pm 0.32$	$0.38 \pm 0.25$		
$V + \mathrm{Jets}$	1 lepton, from W	$3.53 \pm 0.79$	$2.04 \pm 0.76$	$0.36 \pm 0.12$	$0.53 \pm 0.32$	$0.38 \pm 0.25$		
1 0000	1 lepton, from $t$	_	_	_	_	_		
	$\geq 2$ leptons	_	_	_	_	_		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
	Inclusve	_	_	_	_	_		
	1 lepton	_	_	_	_	_		
DN/ LT / AA	1 lepton, from W	_	_	_	_	_		
$DY+Jets \rightarrow \ell\ell$	1 lepton, from t	_	_	_	_	_		
	> 2 leptons	l —	_	_	_	_		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
	Inclusve	_	_	_	_	_		
	1 lepton	_	_	_	_	_		
	1 lepton, from W	_	_	_	_	_		
$DY+Jets \rightarrow \ell\ell$ , M10to50, amcnlo pythia8	1 lepton, from t	_	_	_		_		
	> 2 leptons	_	_	_	_			
	$Z \rightarrow \nu \nu$							
	Inclusve							
	1 lepton	_	_	_	_			
		_	_	_	_	_		
DY+Jets→ ℓℓ, M50, amenlo pythia8	1 lepton, from W	_	_	_	_			
. , ,	1 lepton, from t	_	_	_	_	_		
	≥ 2 leptons	_	_	_	_	_		
	$Z \rightarrow \nu \nu$			_				
	Inclusve	$3.53 \pm 0.79$	$2.04 \pm 0.76$	$0.36 \pm 0.12$	$0.53 \pm 0.32$	$0.38 \pm 0.25$		
	1 lepton	$3.53 \pm 0.79$	$2.04 \pm 0.76$	$0.36 \pm 0.12$	$0.53 \pm 0.32$	$0.38 \pm 0.25$		
W+Jets $\rightarrow \ell \nu$	1 lepton, from W	$3.53 \pm 0.79$	$2.04 \pm 0.76$	$0.36 \pm 0.12$	$0.53 \pm 0.32$	$0.38 \pm 0.25$		
	1 lepton, from $t$	_	_	_	_	_		
	$\geq 2$ leptons	_	_	_	_	_		
	$Z \rightarrow \nu \nu$	_		_	_	_		
	Inclusve							
	1 lepton	_	_	_	_	_		
W+Jets $\rightarrow \ell \nu$ , 100 < HT < 200, madgraph pythia8	1 lepton, from W	_	_	_	_	_		
w ⊤Jets→ εν, 100 < n1 < 200, madgraph pythia8	1 lepton, from t	_	_	_	_	_		
	≥ 2 leptons	_	_	_	_	_		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
	Inclusve	_	_	_	_	_		
	1 lepton	_	_	_	_	_		
	1 lepton, from W	_	_	_	_	_		
W+Jets $\rightarrow \ell \nu$ , 200 < $HT$ < 400, madgraph pythia8	1 lepton, from t	_	_	_	_	_		
	> 2 leptons	_	_	_	_			
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
	Inclusve	$0.67 \pm 0.67$	$0.70 \pm 0.70$	_	_	_		
	1 lepton	0.67 ± 0.67	0.70 ± 0.70 0.70 ± 0.70					
	1 lepton, from W	0.67 ± 0.67 0.67 ± 0.67	0.70 ± 0.70 0.70 ± 0.70	_	_			
W+Jets $\rightarrow \ell \nu,  400 < HT < 600,  {\rm madgraph \ pythia8}$	1 lepton, from w	0.67 ± 0.67	0.70 ± 0.70					
	> 2 leptons		_		_	_		
			_		_	_		
	$Z \rightarrow \nu \nu$				_	_		
	Inclusve	$0.86 \pm 0.25$	$0.06 \pm 0.06$	_	_	_		
	1 lepton	$0.86 \pm 0.25$	$0.06 \pm 0.06$	_	_	_		
W+Jets $\rightarrow \ell \nu$ , 600 < HT < 800, madgraph pythia8	1 lepton, from W	$0.86 \pm 0.25$	$0.06 \pm 0.06$	_	_			
,,,,,,,	1 lepton, from t	_	_	_	_	_		
	≥ 2 leptons	_	_	_	_	_		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
					Continu	ed on next page		

Table 12 – continued from previous page								
		>4jets	>4jets	>4jets	>4jets	>4jets		
Sample	Classification	MT2W> 200	MT2W> 200	MT2W> 200	MT2W > 200	MT2W> 200		
		250 < MET < 350	350 < MET < 450	450 < MET < 550	550 < MET < 650	MET > 650		
	Inclusve	$1.41 \pm 0.20$	0.53 ± 0.11	$0.22 \pm 0.07$		$0.01 \pm 0.01$		
					_			
	1 lepton	$1.41 \pm 0.20$	$0.53 \pm 0.11$	$0.22 \pm 0.07$	<del>-</del>	$0.01 \pm 0.01$		
W+Jets $\rightarrow \ell \nu$ , 800 < HT < 1200, madgraph pythia8	1 lepton, from W	$1.41 \pm 0.20$	$0.53 \pm 0.11$	$0.22 \pm 0.07$	<del></del>	$0.01 \pm 0.01$		
. , , , , , , , , , , , , , , , , , , ,	1 lepton, from $t$	_	_	_	_	_		
	≥ 2 leptons	_	_	_	_			
	$Z \rightarrow \nu \nu$	_	_	_	<del>-</del>	_		
	Inclusve	$0.55 \pm 0.25$	$0.74 \pm 0.27$	$0.14 \pm 0.10$	$0.52 \pm 0.32$	$0.35 \pm 0.25$		
	1 lepton	$0.55 \pm 0.25$	$0.74 \pm 0.27$	$0.14 \pm 0.10$	$0.52 \pm 0.32$	$0.35 \pm 0.25$		
4 4000	1 lepton, from W	$0.55 \pm 0.25$	$0.74 \pm 0.27$	$0.14 \pm 0.10$	$0.52 \pm 0.32$	$0.35 \pm 0.25$		
W+Jets $\rightarrow \ell \nu$ , 1200 $< HT < 2500$ , madgraph pythia8	1 lepton, from t	<u> </u>	_	<u> </u>		_		
	> 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$	_	_	_				
	Inclusve	$0.05 \pm 0.03$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	$0.01 \pm 0.01$	$0.02 \pm 0.01$		
	1 lepton	0.05 ± 0.03	0.01 ± 0.00	0.00 ± 0.00	$0.01 \pm 0.01$ 0.01 + 0.01	$0.02 \pm 0.01$ 0.02 + 0.01		
	1 lepton from W	0.05 ± 0.03	0.01 ± 0.00	0.00 ± 0.00	$0.01 \pm 0.01$ $0.01 \pm 0.01$	$0.02 \pm 0.01$ $0.02 \pm 0.01$		
W+Jets $\rightarrow \ell \nu$ , 2500 $< HT < Inf$ , madgraph pythia8		0.05 ± 0.05	0.01 ± 0.00	0.00 ± 0.00	0.01 ± 0.01	0.02 ± 0.01		
	1 lepton, from t		_		_	_		
	≥ 2 leptons	_	_	_	_	_		
	$Z \rightarrow \nu \nu$							
	Inclusve	$7.95 \pm 0.65$	$4.09 \pm 0.59$	$0.89 \pm 0.25$	$0.53 \pm 0.17$	$0.67 \pm 0.29$		
	1 lepton	$0.20 \pm 0.08$	$0.08 \pm 0.03$	$0.08 \pm 0.04$	$0.05 \pm 0.04$	_		
Rare	1 lepton, from W	$0.15 \pm 0.07$	$0.06 \pm 0.03$	$0.04 \pm 0.03$	$0.04 \pm 0.04$	_		
Itale	1 lepton, from $t$	$0.04 \pm 0.04$	$0.02 \pm 0.01$	$0.04 \pm 0.02$	$0.00 \pm 0.00$	_		
	≥ 2 leptons	$6.59 \pm 0.65$	$3.67 \pm 0.59$	$0.66 \pm 0.24$	$0.44 \pm 0.16$	$0.61 \pm 0.28$		
	$Z \rightarrow \nu \nu$	$1.17 \pm 0.06$	$0.34 \pm 0.02$	$0.15 \pm 0.05$	$0.04 \pm 0.01$	$0.06 \pm 0.04$		
	Inclusve	$2.02 \pm 0.38$	$1.79 \pm 0.52$	$0.45 \pm 0.16$	$0.30 \pm 0.14$	$0.53 \pm 0.27$		
	1 lepton	$0.10 \pm 0.04$	$0.04 \pm 0.02$	$0.03 \pm 0.03$	$0.04 \pm 0.04$			
	1 lepton, from W	$0.10 \pm 0.04$	$0.04 \pm 0.02$	0.03 ± 0.03	$0.04 \pm 0.04$			
diBoson	1 lepton, from t		I					
	> 2 leptons	$1.82 \pm 0.37$	$1.70 \pm 0.52$	$0.35 \pm 0.15$	$0.25 \pm 0.13$	$0.48 \pm 0.27$		
	$Z \rightarrow \nu \nu$	$0.11 \pm 0.06$	$0.05 \pm 0.01$	0.07 + 0.05	$0.01 \pm 0.00$	$0.45 \pm 0.21$ $0.05 \pm 0.04$		
	Inclusve	$0.65 \pm 0.27$	$1.24 \pm 0.49$	$0.12 \pm 0.12$	$0.01 \pm 0.00$ $0.17 \pm 0.12$	$0.40 \pm 0.04$		
		0.65 ± 0.27	1.24 ± 0.49	0.12 ± 0.12	0.17 ± 0.12	0.40 ± 0.26		
	1 lepton	_	_	_	_	_		
W W	1 lepton, from W	_	_	_	_	_		
	1 lepton, from t	l			<del>-</del>			
	≥ 2 leptons	$0.65 \pm 0.27$	$1.24 \pm 0.49$	$0.12 \pm 0.12$	$0.17 \pm 0.12$	$0.40 \pm 0.26$		
	$Z \rightarrow \nu \nu$		_	_				
	Inclusve	$0.65 \pm 0.27$	$1.24 \pm 0.49$	$0.12 \pm 0.12$	$0.17 \pm 0.12$	$0.40 \pm 0.26$		
	1 lepton	_	_	_	_	_		
$WW \rightarrow 2\ell 2\nu$ , powheg	1 lepton, from $W$	_	_	_	_	_		
** ** - ZcZv, powneg	1 lepton, from $t$	_	_	_	_			
	≥ 2 leptons	$0.65 \pm 0.27$	$1.24 \pm 0.49$	$0.12 \pm 0.12$	$0.17 \pm 0.12$	$0.40 \pm 0.26$		
	$Z \rightarrow \nu \nu$	_	_	_	_			
	Inclusve	_	_	_	_	_		
	1 lepton	_	_	_	_			
l	1 lepton, from W	_	_	_	_			
$WW \rightarrow \ell \nu qq$ , powheg	1 lepton, from t	_	_	_	_			
	> 2 leptons	_	_	_	_			
	$Z \rightarrow \nu \nu$	_	_	_				
	Inclusve	$1.16 \pm 0.27$	$0.45 \pm 0.16$	$0.31 \pm 0.10$	$0.11 \pm 0.06$	$0.12 \pm 0.06$		
	1 lepton	$0.10 \pm 0.27$ $0.10 \pm 0.04$	$0.45 \pm 0.16$ $0.04 \pm 0.02$	$0.03 \pm 0.10$ $0.03 \pm 0.03$	$0.11 \pm 0.06$ $0.04 \pm 0.04$	0.12 ± 0.00		
						_		
WZ	1 lepton, from W	$0.10 \pm 0.04$	$0.04 \pm 0.02$	$0.03 \pm 0.03$	$0.04 \pm 0.04$	_		
	1 lepton, from t	1 00 1 0 00						
	≥ 2 leptons	$1.06 \pm 0.26$	$0.40 \pm 0.16$	0.23 ± 0.08	$0.07 \pm 0.04$	0.08 ± 0.05		
	$Z \rightarrow \nu \nu$			$0.05 \pm 0.05$		$0.04 \pm 0.04$		
	Inclusve	$0.86 \pm 0.25$	$0.31 \pm 0.15$	$0.20 \pm 0.08$	$0.05 \pm 0.03$	$0.08 \pm 0.05$		
	1 lepton	_	_	_	_	_		
$WZ \rightarrow 3\ell\nu$ , powheg pythia8	1 lepton, from W	_	_	_	_	_		
, 2 .ocz, powneg pytmao	1 lepton, from $t$	_	_	_	_	_		
	≥ 2 leptons	$0.86 \pm 0.25$	$0.31 \pm 0.15$	$0.20 \pm 0.08$	$0.05 \pm 0.03$	$0.08 \pm 0.05$		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
					Continue	ed on next page		

Table 12 – continued from previous page								
		≥4jets	≥4jets	≥4jets	≥4jets	≥4jets		
Sample	Classification	$MT2W \ge 200$	$MT2W \ge 200$	$MT2W \ge 200$	$MT2W \ge 200$	$MT2W \ge 200$		
		250 < MET < 350	350 < MET < 450	450 < MET < 550	550 < MET < 650	MET > 650		
	Inclusve	$0.20 \pm 0.06$	$0.10 \pm 0.04$	$0.04 \pm 0.02$	$0.02 \pm 0.01$			
	1 lepton	0.20 ± 0.00	0.10 ± 0.04	0.04 ± 0.02	0.02 ± 0.01	_		
	1 lepton, from W		_	_		_		
$WZ\rightarrow 2\ell 2Q$ , amcnlo pythia8	1 lepton, from t		_			_		
	> 2 leptons	$0.20 \pm 0.06$	$0.10 \pm 0.04$	$0.04 \pm 0.02$	$0.02 \pm 0.01$	_		
	$Z \rightarrow \nu \nu$	0.20 ± 0.00	0.10 ± 0.01	0.01 ± 0.02	0.02 ± 0.01	_		
	Inclusve	$0.10 \pm 0.04$	$0.04 \pm 0.02$	$0.03 \pm 0.03$	$0.04 \pm 0.04$	_		
	1 lepton	$0.10 \pm 0.04$ $0.10 \pm 0.04$	$0.04 \pm 0.02$ $0.04 \pm 0.02$	0.03 ± 0.03	$0.04 \pm 0.04$ $0.04 \pm 0.04$	_		
	1 lepton, from W	0.10 ± 0.04	$0.04 \pm 0.02$ $0.04 \pm 0.02$	0.03 ± 0.03	$0.04 \pm 0.04$ $0.04 \pm 0.04$	_		
$WZ \rightarrow \ell \nu 2Q$ , amenlo pythia8	1 lepton, from t	0.10 ± 0.04	0.04 ± 0.02	0.05 ± 0.05	0.04 ± 0.04	_		
	> 2 leptons		_			_		
	$Z \rightarrow \nu \nu$		_			_		
	Inclusve	_	_	$0.05 \pm 0.05$	_	$0.04 \pm 0.04$		
	1 lepton	_	_	0.00 ± 0.00		0.04 ± 0.04		
	1 lepton, from W		_			_		
$WZ \rightarrow 1\ell 3\nu$ , amcnlo pythia8	1 lepton, from t	_	_	_		_		
	> 2 leptons	_	_	_		_		
	$Z \rightarrow \nu \nu$	_	_	$0.05 \pm 0.05$	_	$0.04 \pm 0.04$		
	Inclusve	$0.21 \pm 0.04$	$0.10 \pm 0.03$	$0.03 \pm 0.01$	$0.01 \pm 0.00$	$0.01 \pm 0.00$		
	1 lepton	l """ = """	1 0.10 ± 0.00	1 0.00 ± 0.01				
	1 lepton, from W	_	_	_	_			
ZZ	1 lepton, from t	_	_	_	_	_		
	> 2 leptons	$0.11 \pm 0.03$	$0.05 \pm 0.03$	_	$0.00 \pm 0.00$	_		
	$Z \rightarrow \nu \nu$	0.11 ± 0.01	0.05 ± 0.01	$0.03 \pm 0.01$	0.01 ± 0.00	$0.01 \pm 0.00$		
	Inclusve	$0.11 \pm 0.03$	0.05 ± 0.03		0.00 ± 0.00			
	1 lepton	0.11 ± 0.00		_				
	1 lepton, from W	_	_	_				
$ZZ\rightarrow 2\ell 2Q$ , amenlo pythia8	1 lepton, from t	_	_	_				
	> 2 leptons	$0.11 \pm 0.03$	$0.05 \pm 0.03$	_	$0.00 \pm 0.00$	_		
	$Z \rightarrow \nu \nu$			_		_		
	Inclusve	$0.11 \pm 0.01$	$0.05 \pm 0.01$	$0.02 \pm 0.01$	$0.01 \pm 0.00$	$0.01 \pm 0.00$		
	1 lepton							
	1 lepton, from W	_	_	_		_		
$ZZ\rightarrow 2\ell 2\nu$ , powheg pythia8	1 lepton, from t	_	_	_		_		
	> 2 leptons	_	_	_		_		
	$Z \rightarrow \nu \nu$	$0.11 \pm 0.01$	$0.05 \pm 0.01$	$0.02 \pm 0.01$	$0.01 \pm 0.00$	$0.01 \pm 0.00$		
	Inclusve	_	_	$0.01 \pm 0.01$	_	_		
	1 lepton	_	_	_	_	_		
77 . 202	1 lepton, from W	_	_	_	_			
$ZZ \rightarrow 2Q2\nu$ , amcnlo pythia8	1 lepton, from t	_	_	_	_			
	≥ 2 leptons	_	_	_	_			
	$Z \rightarrow \nu \nu$	-	_	$0.01 \pm 0.01$	_	_		
	Inclusve	$5.93 \pm 0.53$	$2.31 \pm 0.29$	$0.44 \pm 0.19$	$0.23 \pm 0.10$	$0.14 \pm 0.09$		
	1 lepton	$0.10 \pm 0.07$	$0.04 \pm 0.02$	$0.05 \pm 0.03$	$0.00 \pm 0.00$	_		
$tar{t}+V$	1 lepton, from W	$0.06 \pm 0.06$	$0.02 \pm 0.02$	$0.02 \pm 0.02$	_	_		
ιι <del>+</del> ν	1 lepton, from $t$	$0.04 \pm 0.04$	$0.02 \pm 0.01$	$0.04 \pm 0.02$	$0.00 \pm 0.00$	_		
	≥ 2 leptons	$4.77 \pm 0.53$	$1.97 \pm 0.29$	$0.31 \pm 0.19$	$0.19 \pm 0.10$	$0.13 \pm 0.09$		
	$Z \rightarrow \nu \nu$	$1.06 \pm 0.03$	$0.29 \pm 0.01$	$0.08 \pm 0.01$	$0.03 \pm 0.00$	$0.01 \pm 0.00$		
	Inclusve	$3.68 \pm 0.53$	$1.72 \pm 0.29$	$0.28 \pm 0.19$	$0.17 \pm 0.10$	$0.12 \pm 0.09$		
	1 lepton	$0.06 \pm 0.07$	$0.03 \pm 0.02$	$0.05 \pm 0.03$	_			
+++ 1 TAZ	1 lepton, from W	$0.06 \pm 0.06$	$0.02 \pm 0.02$	$0.02 \pm 0.02$	_			
$tar{t}+W$	1 lepton, from $t$	_	$0.01 \pm 0.01$	$0.03 \pm 0.02$	_			
	≥ 2 leptons	$3.62 \pm 0.53$	$1.68 \pm 0.28$	$0.23 \pm 0.19$	$0.17 \pm 0.10$	$0.12 \pm 0.09$		
	$Z \rightarrow \nu \nu$	<u> </u>		_	<u> </u>			
<u> </u>	Inclusve	$3.32 \pm 0.50$	$1.48 \pm 0.27$	$0.14 \pm 0.17$	$0.10 \pm 0.09$	$0.12 \pm 0.07$		
	1 lepton	$0.06 \pm 0.06$	$0.02 \pm 0.02$	$0.02 \pm 0.02$	_	_		
$t\bar{t} + W \rightarrow \ell\nu$ , amenlo pythia8	1 lepton, from W	$0.06 \pm 0.06$	$0.02 \pm 0.02$	$0.02 \pm 0.02$	_	_		
vo i vo vos, amenio pytinao	1 lepton, from $t$	<u> </u>	_	<u> </u>	<del>-</del>	<del>-</del>		
	≥ 2 leptons	$3.27 \pm 0.49$	$1.45 \pm 0.27$	$0.12 \pm 0.17$	$0.10 \pm 0.09$	$0.12 \pm 0.07$		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
					Continu	ed on next page		

Table 12 – continued from previous page						
Sample		≥4jets	≥4jets	≥4jets	≥4jets	≥4jets
	Classification	$MT2W \ge 200$				
		250 < MET < 350	350 < MET < 450	450 < MET < 550	550 < MET < 650	MET > 650
$t\bar{t}+W{ ightarrow}QQ$ , amenlo pythia8	Inclusve	$0.35 \pm 0.19$	$0.24 \pm 0.09$	$0.14 \pm 0.08$	$0.06 \pm 0.04$	_
	1 lepton	_	$0.01 \pm 0.01$	$0.03 \pm 0.02$	_	_
	1 lepton, from W	_	_	_	_	_
	1 lepton, from $t$	_	$0.01 \pm 0.01$	$0.03 \pm 0.02$	_	_
	≥ 2 leptons	$0.35 \pm 0.19$	$0.23 \pm 0.09$	$0.11 \pm 0.08$	$0.06 \pm 0.04$	_
	$Z \rightarrow \nu \nu$	_	_	_	_	_
$tar{t}+Z$	Inclusve	$2.26 \pm 0.04$	$0.59 \pm 0.02$	$0.16 \pm 0.01$	$0.06 \pm 0.01$	$0.02 \pm 0.00$
	1 lepton	$0.04 \pm 0.01$	$0.01 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	_
	1 lepton, from W	_	_	_	_	_
	1 lepton, from $t$	$0.04 \pm 0.01$	$0.01 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	_
	≥ 2 leptons	$1.15 \pm 0.03$	$0.29 \pm 0.01$	$0.08 \pm 0.01$	$0.03 \pm 0.00$	$0.01 \pm 0.00$
	$Z \rightarrow \nu \nu$	$1.06 \pm 0.03$	$0.29 \pm 0.01$	$0.08 \pm 0.01$	$0.03 \pm 0.00$	$0.01 \pm 0.00$
$tar{t}+Z,\;  ext{madgraph}$	Inclusve	$2.26 \pm 0.04$	$0.59 \pm 0.02$	$0.16 \pm 0.01$	$0.06 \pm 0.01$	$0.02 \pm 0.00$
	1 lepton	$0.04 \pm 0.01$	$0.01 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	_
	1 lepton, from W	_	_	_	_	_
	1 lepton, from $t$	$0.04 \pm 0.01$	$0.01 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	l —
	≥ 2 leptons	$1.15 \pm 0.03$	$0.29 \pm 0.01$	$0.08 \pm 0.01$	$0.03 \pm 0.00$	$0.01 \pm 0.00$
	$Z \rightarrow \nu \nu$	$1.06 \pm 0.03$	$0.29 \pm 0.01$	$0.08 \pm 0.01$	$0.03 \pm 0.00$	$0.01 \pm 0.00$
$tar{t} + Z  ightarrow QQ$ , amc nlo pythia 8	Inclusve	$0.66 \pm 0.24$	$0.33 \pm 0.17$	$0.01 \pm 0.03$	_	$0.03 \pm 0.02$
	1 lepton	$0.06 \pm 0.07$	_	_	_	_
	1 lepton, from W	_	_	_	_	_
	1 lepton, from t	$0.06 \pm 0.07$	_	_	_	_
	≥ 2 leptons	$0.60 \pm 0.23$	$0.33 \pm 0.16$	$0.01 \pm 0.03$	_	$0.03 \pm 0.02$
	$Z \rightarrow \nu \nu$	_	_	_	_	_
$tar{t} + Z { ightarrow} 2\ell 2 u,$ amenlo pythia 8	Inclusve	$1.33 \pm 0.43$	$0.74 \pm 0.25$	$0.33 \pm 0.12$	$0.06 \pm 0.06$	$0.11 \pm 0.04$
	1 lepton	_	_	_	_	_
	1 lepton, from W	_	_	_	_	_
	1 lepton, from $t$	_	_	_	_	_
	≥ 2 leptons	$1.25 \pm 0.38$	$0.59 \pm 0.22$	$0.19 \pm 0.10$	$0.06 \pm 0.05$	$0.05 \pm 0.03$
	$Z \rightarrow \nu \nu$	$0.09 \pm 0.19$	$0.14 \pm 0.12$	$0.14 \pm 0.07$	_	$0.06 \pm 0.03$