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/μ , MET	Inclusve	107.00 ± 10.34	17.00 ± 4.12	8.00 ± 2.83
	Inclusve	88.56 ± 4.72	13.63 ± 1.81	4.34 ± 0.96
	1 lepton	20.44 ± 3.81	4.53 ± 1.46	2.40 ± 0.79
	1 lepton, from W	19.85 ± 3.80	4.53 ± 1.46	2.40 ± 0.79
All Background	1 lepton, from t	0.59 ± 0.30		2:10 = 0:10
	> 2 leptons	62.89 ± 2.68	7.23 ± 0.95	0.72 ± 0.20
	$Z \rightarrow \nu \nu$	5.23 ± 0.75	1.87 ± 0.50	1.23 ± 0.51
	Inclusve	57.79 ± 2.05	6.23 ± 0.62	0.49 ± 0.16
	1 lepton	0.59 ± 0.30	<u> </u>	
, ,	1 lepton, from W	_	_	_
$tar{t}$	1 lepton, from t	0.59 ± 0.30	_	_
	≥ 2 leptons	57.20 ± 2.03	6.23 ± 0.62	0.49 ± 0.16
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	0.27 ± 0.27	_	_
	1 lepton	0.27 ± 0.27	_	_
$t\bar{t}$, single lepFromT, madgraph pythia8	1 lepton, from W	_	_	_
tt, singic icprionit, maugiaph pytmas	1 lepton, from t	0.27 ± 0.27	_	_
	≥ 2 leptons	_	<u> </u>	_
	$Z \rightarrow \nu \nu$		<u> </u>	
	Inclusve	0.32 ± 0.14		
	1 lepton	0.32 ± 0.14	<u> </u>	_
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	1 lepton, from W	<u> </u>	_	_
,,	1 lepton, from t	0.32 ± 0.14	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$			
	Inclusve	57.20 ± 2.03	6.23 ± 0.62	0.49 ± 0.16
	1 lepton	_	-	_
$t\bar{t}$, diLepton, madgraph pythia8, ext1	1 lepton, from W	_	-	_
	1 lepton, from t	57.20 ± 2.03	6.23 ± 0.62	0.49 ± 0.16
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	57.20 ± 2.03	6.23 ± 0.62	0.49 ± 0.16
	$Z \rightarrow \nu \nu$ Inclusve	3.65 ± 1.66	0.70 ± 0.70	
	1 lepton	3.05 ± 1.00	0.70 ± 0.70	_
	1 lepton from W	_	-	_
single t	1 lepton, from t			
	> 2 leptons	3.65 ± 1.66	0.70 ± 0.70	
	$Z \rightarrow \nu \nu$	0.00 ± 1.00		
	Inclusve	3.65 ± 1.66	0.70 ± 0.70	_
	1 lepton			
· 1 / / TT/ 1 1	1 lepton, from W	_	_	_
single $t \ t - W$ -channel	1 lepton, from t	_	_	_
	≥ 2 leptons	3.65 ± 1.66	0.70 ± 0.70	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	_	_	_
	1 lepton	_	_	_
single t , $t - W$ -channel, powheg pythia8	1 lepton, from W	_	<u> </u>	_
single s, s w -channel, powneg pythiao	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	<u> </u>	_
	Inclusve	3.65 ± 1.66	0.70 ± 0.70	
	1 lepton	_	_	_
single \bar{t} , $t - W$ -channel, powheg pythia8	1 lepton, from W	_	_	_
3 3 4 4, 7 4 4 4 4 4 7 7 4 4 4 3 1 7 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	1 lepton, from t	2.65 ± 1.66	0.70 + 0.70	_
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	3.65 ± 1.66	0.70 ± 0.70	_
	$Z \rightarrow \nu \nu$ Inclusve			_
	1 lepton	_	_	_
	1 lepton 1 lepton, from W			
single t non $t - W$ -channel	1 lepton, from W 1 lepton, from t			
	≥ 2 leptons			
	$Z \rightarrow \nu \nu$	_	_	_
	$L \rightarrow \nu \nu$	l	Cox	ntinued on next page
			Col	namaca on next page

Table 1 – continued from previous page

Sample Classification $\frac{2 \text{ jets}}{250 \text{ km}^{2} \text{ Continue}} \ge 0.4 \\ -250 \text{ km}^{2} \text{ Continue} \ge 0.4 \\ -250 k$	Table 1 – continued from previous page							
$ \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 & 17.02 \pm 3.65 & 4.36 \pm 1.45 & 2.41 \pm 0.79 \\ \hline & 2 \log ton & W & 17.02 \pm 3.65 & 4.36 \pm 1.45 & 2.41 \pm 0.79 \\ \hline & 2 \log ton & W & 17.02 \pm 3.65 & 4.36 \pm 1.45 & 2.41 \pm 0.79 \\ \hline & 2 \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 & 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 $			_	_	_			
$V+ \text{Jets} \qquad \begin{array}{c} \text{Incluse} \\ 1 \text{ lepton} \\ 1 \text$			_	_	_			
$V+ \text{Jets} \qquad \begin{cases} & 1 \text{ lepton, from } W \\ & 1 \text{ lepton, from } W \\ & 2 \text{ Jeptons} \\ & Z - \nu \nu \\ \\ & DY+ \text{Jets} \rightarrow \ell \ell \end{cases} \qquad \begin{cases} & 1 \text{ lepton, from } W \\ & 1 \text{ lepton, from } W \\ & 2 \text{ Jeptons} \\ & Z - \nu \nu \\ \\ & DY+ \text{Jets} \rightarrow \ell \ell \end{cases} \qquad \begin{cases} & 1 \text{ lepton, from } W \\ & 1 \text{ lepton, from } W \\ & 2 \text{ Jeptons} \\ & Z - \nu \nu \\ \\ & DY+ \text{Jets} \rightarrow \ell \ell \end{cases} \qquad \begin{cases} & 1 \text{ lepton, from } W \\ & 2 \text{ Jeptons} \\ & Z - \nu \nu \\ \\ & DY+ \text{Jets} \rightarrow \ell \ell \end{cases} \qquad \begin{cases} & 1 \text{ lepton, from } W \\ & 2 \text{ leptons} \\ & 2 - \nu \nu \\ & 1 \text{ lepton, from } W \\ & 2 \text{ leptons} \\ & 2 - \nu \nu \\ & 1 \text{ lepton, from } W \\ & 1 \text{ lepton, from } W \\ & 2 \text{ leptons} \\ & 2 - \nu \nu \\ & 1 \text{ lepton, from } W \\ & 2 \text{ leptons} \\ & 2 - \nu \nu \\ & 1 \text{ lepton, from } W \\ & 2 \text{ leptons} \\ & 2 \text{ leptons} \\ & 2 - \nu \nu \\ & 1 \text{ lepton, from } W \\ & 2 \text{ leptons} \\ & 2 \text{ lepton, from } W \\ & 2 \text{ leptons} \\ & 2 \text{ lepton, from } W \\ & 2 \text{ leptons} \\ & 2 \text{ lepton, from } W \\ & 2 \text{ leptons} \\ & 2 \text$			17.02 ± 3.65	4.36 ± 1.45	2.41 ± 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{ 2 leptons} \\ Z = \nu\nu \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ 2 leptons} \\ Z = \nu\nu \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ 2 leptons} \\ 2 \text{ 2 lepton } W \\ 1 \text{ lepton, from } W \\ 2 \text{ 2 lepton } W \\ 1 \text{ lepton, from } W \\ 2 \text{ 2 leptons} \\ 2 $								
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$								
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	V+Jets							
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			_	_	<u>—</u>			
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	<u> </u>	_			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$DY + Jets \rightarrow \ell\ell$		_	_	_			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_			
			_	_	_			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_			
$ \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 ± 3.65	4.36 ± 1.45	2.41 ± 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 ± 3.16	2.80 ± 1.27	0.76 ± 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 ± 0.89	0.40 ± 0.40	0.42 ± 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 ± 0.26	0.22 ± 0.13	0.34 ± 0.16			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$								
w+Jets $\rightarrow \ell \nu$, 000 $<$ H1 $<$ 800, magraph pythias 1 lepton, from t $ -$								
$\geq 2 \ ext{leptons} \qquad \qquad - \qquad \qquad - \qquad \qquad - \qquad \qquad Z o u otag $	$w + \text{Jets} \rightarrow \ell \nu$, 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			

Table 1 – continued from previous page

Tab	e 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 ± 0.08	0.16 ± 0.08	0.56 ± 0.15
	1 lepton	0.16 ± 0.08	0.16 ± 0.08	0.56 ± 0.15
W+Jets $\rightarrow \ell \nu$, 800 $< HT < 1200$, madgraph pythia8	1 lepton, from W	0.16 ± 0.08	0.16 ± 0.08	0.56 ± 0.15
W + 5005 - CD, 000 < 111 < 1200, madgraph pytmas	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	
	Inclusve	0.66 ± 0.47	0.79 ± 0.56	0.33 ± 0.33
	1 lepton	0.66 ± 0.47	0.79 ± 0.56	0.33 ± 0.33
W+Jets $\rightarrow \ell \nu$, 1200 < HT < 2500, madgraph pythia8	1 lepton, from W	0.66 ± 0.47	0.79 ± 0.56	0.33 ± 0.33
	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$		_	
	Inclusve	0.05 ± 0.04	_	0.00 ± 0.00
	1 lepton	0.05 ± 0.04	_	0.00 ± 0.00
W+Jets $\rightarrow \ell \nu$, 2500 $< HT < Inf$, madgraph pythia8	1 lepton, from W	0.05 ± 0.04	_	0.00 ± 0.00
, , , , , , , , , , , , , , , , , , , ,	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$ Inclusve	10.11 ± 1.42	2 25 + 0 52	1 42 ± 0 52
		10.11 ± 1.42 2.83 ± 1.07	2.35 ± 0.53 0.17 ± 0.07	1.43 ± 0.53 -0.02 \pm 0.03
	1 lepton 1 lepton, from W	2.83 ± 1.07 2.83 ± 1.07	0.17 ± 0.07 0.17 ± 0.07	-0.02 ± 0.03 -0.02 ± 0.03
Rare	1 lepton, from w	0.00 ± 0.00	0.17 = 0.07	-0.02 ± 0.03
	> 2 leptons	2.05 ± 0.55	0.30 ± 0.17	0.22 ± 0.13
	$Z \rightarrow \nu \nu$	5.23 ± 0.75	1.87 ± 0.50	1.23 ± 0.13
	Inclusve	7.83 ± 1.41	1.88 ± 0.53	1.18 ± 0.53
	1 lepton	2.83 ± 1.07	0.17 ± 0.07	-0.02 ± 0.03
	1 lepton, from W	2.83 ± 1.07	0.17 ± 0.07	-0.02 ± 0.03
diBoson	1 lepton, from t	2.00 ± 1.01	0.11 ± 0.01	0.02 ± 0.00
	> 2 leptons	1.63 ± 0.54	0.29 ± 0.17	0.20 ± 0.12
	$Z \rightarrow \nu \nu$	3.36 ± 0.75	1.42 ± 0.50	1.00 ± 0.51
	Inclusve	3.93 ± 1.19	0.20 ± 0.14	0.08 ± 0.08
	1 lepton	2.38 ± 1.07		
*****	1 lepton, from W	2.38 ± 1.07	_	_
WW	1 lepton, from t	_	_	_
	≥ 2 leptons	1.55 ± 0.54	0.20 ± 0.14	0.08 ± 0.08
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	1.55 ± 0.54	0.20 ± 0.14	0.08 ± 0.08
	1 lepton	_	_	_
$WW \rightarrow 2\ell 2\nu$, powheg	1 lepton, from W	_	_	_
W W -2020, powneg	1 lepton, from t	_	_	l —
	≥ 2 leptons	1.55 ± 0.54	0.20 ± 0.14	0.08 ± 0.08
	$Z \rightarrow \nu \nu$	<u> </u>		<u> </u>
	Inclusve	2.38 ± 1.07	_	_
	1 lepton	2.38 ± 1.07	_	_
$WW \rightarrow \ell \nu qq$, powheg	1 lepton, from W	2.38 ± 1.07	_	_
11/ F	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$			
	Inclusve	3.73 ± 0.76	1.65 ± 0.51	1.07 ± 0.52
	1 lepton	0.45 ± 0.13	0.17 ± 0.07	-0.02 ± 0.03
WZ	1 lepton, from W	0.45 ± 0.13	0.17 ± 0.07	-0.02 ± 0.03
	1 lepton, from t	0.08 ± 0.04	0.00 ± 0.00	0.12 ± 0.00
	≥ 2 leptons	0.08 ± 0.04	0.09 ± 0.09	0.12 ± 0.09
	$Z \rightarrow \nu \nu$	3.20 ± 0.75	1.39 ± 0.50	0.96 ± 0.51
	Inclusve 1 lepton	0.04 ± 0.04	0.09 ± 0.09	0.11 ± 0.09
	1 lepton 1 lepton, from W			
$WZ \rightarrow 3\ell\nu$, powheg pythia8	1 lepton, from t			I = =
	≥ 2 leptons	0.04 ± 0.04	0.09 ± 0.09	0.11 ± 0.09
	$Z \rightarrow \nu \nu$	0.04 ± 0.04	0.00 ± 0.00	
	2	I .	Cox	ntinued on next page
			COI	on next page

Table 1 – continued from previous 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 ± 0.02	_	0.01 ± 0.01
	1 lepton	_	<u> </u>	_
$WZ\rightarrow 2\ell 2Q$, amenlo pythia8	1 lepton, from W	_	_	_
77 2 · 2020g, amonto py onido	1 lepton, from t	-	_	<u> </u>
	≥ 2 leptons	0.04 ± 0.02	_	0.01 ± 0.01
	$Z \rightarrow \nu \nu$			
	Inclusve	0.45 ± 0.13	0.17 ± 0.07	-0.02 ± 0.03
	1 lepton 1 lepton, from W	0.45 ± 0.13	$\begin{array}{c} 0.17 \pm 0.07 \\ 0.17 \pm 0.07 \end{array}$	-0.02 ± 0.03
$WZ \rightarrow \ell \nu 2Q$, amcnlo pythia8	1 lepton, from t	0.45 ± 0.13	0.17 ± 0.07	-0.02 ± 0.03
	> 2 leptons	_		_
	$Z \rightarrow \nu \nu$			
	Inclusve	3.20 ± 0.75	1.39 ± 0.50	0.96 ± 0.51
	1 lepton	0.20 ± 0.10		0.00 ± 0.01
	1 lepton, from W	_	_	_
$WZ \rightarrow 1\ell 3\nu$, amcnlo pythia8	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	3.20 ± 0.75	1.39 ± 0.50	0.96 ± 0.51
	Inclusve	0.16 ± 0.02	0.03 ± 0.01	0.04 ± 0.01
	1 lepton	_	_	—
ZZ	1 lepton, from W	_	_	_
22	1 lepton, from t	_	_	_
	≥ 2 leptons	-	-	. .
	$Z \rightarrow \nu \nu$	0.16 ± 0.02	0.03 ± 0.01	0.04 ± 0.01
	Inclusve	_	_	_
	1 lepton	_	_	_
$ZZ\rightarrow 2\ell 2Q$, amcolo pythia8	1 lepton, from W	_	_	_
	1 lepton, from t	_	_	_
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	_	_	_
	Inclusve	0.13 ± 0.02	0.04 ± 0.01	0.03 ± 0.01
	1 lepton	0.15 ± 0.02	0.04 ± 0.01	0.00 ± 0.01
	1 lepton, from W	_	_	_
$ZZ\rightarrow 2\ell 2\nu$, powheg pythia8	1 lepton, from t	_	_	_
	> 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	0.13 ± 0.02	0.04 ± 0.01	0.03 ± 0.01
	Inclusve	0.03 ± 0.01	-0.01 ± 0.01	0.01 ± 0.01
	1 lepton	_	_	_
$ZZ\rightarrow 2Q2\nu$, amenlo pythia8	1 lepton, from W	-	<u> </u>	_
, amomo pjamao	1 lepton, from t	_	_	_
	≥ 2 leptons	l 		l
	$Z \rightarrow \nu \nu$	0.03 ± 0.01	-0.01 ± 0.01	0.01 ± 0.01
	Inclusve	2.28 ± 0.12	0.46 ± 0.02	0.25 ± 0.04
	1 lepton	0.00 ± 0.00	_	_
$t\bar{t}+V$	1 lepton, from W 1 lepton, from t	0.00 ± 0.00	_	_
	≥ 2 leptons	0.00 ± 0.00 0.41 ± 0.11	0.02 ± 0.01	0.02 ± 0.04
	$Z \rightarrow \nu \nu$	0.41 ± 0.11 1.87 ± 0.04	0.02 ± 0.01 0.45 ± 0.02	0.02 ± 0.04 0.23 ± 0.01
	Inclusve	0.41 ± 0.11	0.43 ± 0.02 0.01 ± 0.01	0.02 ± 0.04
	1 lepton	0.41 ± 0.11	- 0.01	0.02 ± 0.04
.=	1 lepton, from W	_	_	_
$t\bar{t}+W$	1 lepton, from t	_	_	_
	≥ 2 leptons	0.41 ± 0.11	0.01 ± 0.01	0.02 ± 0.04
	$Z \rightarrow \nu \nu$	-	_	_
	Inclusve	0.32 ± 0.11	_	0.02 ± 0.04
	1 lepton	_	_	_
$t\bar{t} + W \rightarrow \ell\nu$, amenlo pythia8	1 lepton, from W	_	_	_
, , amonto py anto	1 lepton, from t	l	_	l .
	≥ 2 leptons	0.32 ± 0.11	_	0.02 ± 0.04
	$Z \rightarrow \nu \nu$	_		
			Сот	ntinued on next page

Table 1 - continued from previous page

Tab	le 1 - continued from	m 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	0.08 ± 0.04	0.01 ± 0.01	
	1 lepton	0.00 ± 0.01	0.01 ± 0.01	_
	1 lepton, from W	_		
$t\bar{t} + W \rightarrow QQ$, amcnlo pythia8	1 lepton, from t	_		
	> 2 leptons	0.08 ± 0.04	0.01 ± 0.01	
	$Z \rightarrow \nu \nu$	0.08 ± 0.04	0.01 ± 0.01	
	Inclusve	1.88 + 0.04	0.45 ± 0.02	0.23 ± 0.01
	1 lepton	0.00 ± 0.00	0.45 ± 0.02	0.23 ± 0.01
		0.00 ± 0.00	_	_
$tar{t}+Z$	1 lepton, from W		_	_
	1 lepton, from t	0.00 ± 0.00		_
	≥ 2 leptons	0.01 ± 0.00	0.00 ± 0.00	l
	$Z \rightarrow \nu \nu$	1.87 ± 0.04	0.45 ± 0.02	0.23 ± 0.01
	Inclusve	1.88 ± 0.04	0.45 ± 0.02	0.23 ± 0.01
	1 lepton	0.00 ± 0.00	_	_
$t\bar{t} + Z$, madgraph	1 lepton, from W	-	_	_
tt + Z, madgraph	1 lepton, from t	0.00 ± 0.00	_	_
	≥ 2 leptons	0.01 ± 0.00	0.00 ± 0.00	_
	$Z \rightarrow \nu \nu$	1.87 ± 0.04	0.45 ± 0.02	0.23 ± 0.01
	Inclusve	0.08 ± 0.07	_	_
	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	0.08 ± 0.07	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	1.77 ± 0.26	0.76 ± 0.17	0.27 ± 0.08
(Ī Z 0/0 1 1); O	1 lepton	_	_	—
	1 lepton, from W	_	_	_
$t\bar{t} + Z \rightarrow 2\ell 2\nu$, amenlo pythia8	1 lepton, from t	_	_	_
	> 2 leptons	-0.00 ± 0.03	0.09 ± 0.09	_
	$Z \rightarrow \nu \nu$	1.77 ± 0.26	0.66 ± 0.14	0.27 ± 0.08

SR, Nominal Systematic, Yield Table for Input Samples

S	R, Nominal Systemati	c, Yield Table for Input			
		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/μ , MET	Inclusve	63.00 ± 7.94	15.00 ± 3.87	9.00 ± 3.00	4.00 ± 2.00
	Inclusve	74.05 L 4.00	14.01 1.04	F C4 1 10	0.01 0.00
	1 lepton	74.05 ± 4.96 23.93 ± 3.98	14.01 ± 1.84 5.12 ± 1.47	5.64 ± 1.13 2.44 ± 0.87	2.81 ± 0.96 2.00 ± 0.92
	1 lepton from W	23.93 ± 3.98 23.70 ± 3.97	5.12 ± 1.47 5.12 ± 1.47	2.44 ± 0.87 2.44 ± 0.87	
All Background	1 lepton, from t	0.23 ± 0.13	0.00 ± 0.00	0.00 ± 0.00	2.00 ± 0.92
	≥ 2 leptons	44.16 ± 2.89	6.77 ± 1.00	1.59 ± 0.60	0.42 ± 0.16
	$Z \rightarrow \nu \nu$	5.97 ± 0.63	2.12 ± 0.48	1.61 ± 0.40	0.42 ± 0.10 0.39 ± 0.22
	Inclusve	36.05 ± 1.81	5.30 ± 0.63	0.99 ± 0.38	0.39 ± 0.22 0.28 ± 0.11
	1 lepton	0.23 ± 0.13	3.30 ± 0.03	0.99 ± 0.36	0.28 ± 0.11
	1 lepton from W	0.23 ± 0.13	_	_	_
$tar{t}$	1 lepton, from t	0.23 ± 0.13	_	_	_
	> 2 leptons	35.82 ± 1.81	5.30 ± 0.63	0.99 ± 0.38	0.28 ± 0.11
	$Z \rightarrow \nu \nu$	33.82 ± 1.81	3.30 ± 0.03	0.99 ± 0.36	0.28 ± 0.11
	Inclusve		_		
	1 lepton		_	_	_
	1 lepton, from W		_	_	_
$t\bar{t}$, single lepFromT, madgraph pythia8	1 lepton, from t				
	≥ 2 leptons				
	$Z \rightarrow \nu \nu$				
	Inclusve	0.23 ± 0.13		_	
	1 lepton	0.23 ± 0.13 0.23 ± 0.13			
	1 lepton from W	0.23 ± 0.13			
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	1 lepton, from t	0.23 ± 0.13			
	> 2 leptons	0.25 ± 0.15	_		_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	35.82 ± 1.81	5.30 ± 0.63	0.99 ± 0.38	0.28 ± 0.11
	1 lepton	- 1.01	0.00 ± 0.00	0.00 ± 0.00	0.20 ± 0.11
	1 lepton, from W	_	_	_	_
$t\bar{t}$, diLepton, madgraph pythia8, ext1	1 lepton, from t	_	_	_	_
	> 2 leptons	35.82 ± 1.81	5.30 ± 0.63	0.99 ± 0.38	0.28 ± 0.11
	$Z \rightarrow \nu \nu$				
	Inclusve	7.06 ± 2.32	1.05 ± 0.74	0.38 ± 0.38	
	1 lepton	0.70 ± 0.70	1		_
	1 lepton, from W	0.70 ± 0.70	_	_	_
single t	1 lepton, from t		_	_	_
	> 2 leptons	6.36 ± 2.21	1.05 ± 0.74	0.38 ± 0.38	_
	$Z \rightarrow \nu \nu$	<u> </u>			_
	Inclusve	7.06 ± 2.32	1.05 ± 0.74	0.38 ± 0.38	_
	1 lepton	0.70 ± 0.70	_	_	_
-il- 4 4 W -bl	1 lepton, from W	0.70 ± 0.70	_	_	_
single t t – W -channel	1 lepton, from t	_	_	_	_
	\geq 2 leptons	6.36 ± 2.21	1.05 ± 0.74	0.38 ± 0.38	_
	$Z \rightarrow \nu \nu$	_		<u> </u>	
	Inclusve				
	1 lepton	_	_	_	_
single $t, t - W$ -channel, powheg pythia8	1 lepton, from W	<u> </u>	_	_	_
single i, i - w -channel, powneg pythias	1 lepton, from t	<u> </u>	_	_	_
	≥ 2 leptons	-	_	_	-
	$Z \rightarrow \nu \nu$	<u> </u>	_		
	Inclusve	7.06 ± 2.32	1.05 ± 0.74	0.38 ± 0.38	
	1 lepton	0.70 ± 0.70	_	_	_
single \bar{t} , $t-W$ -channel, powheg pythia8	1 lepton, from W	0.70 ± 0.70	_	_	_
omate t, t w -channel, powneg pythiao	1 lepton, from t	-	_	<u> </u>	_
	≥ 2 leptons	6.36 ± 2.21	1.05 ± 0.74	0.38 ± 0.38	_
	$Z \rightarrow \nu \nu$	<u> </u>	_	_	
	Inclusve	_			
				ı	
	1 lepton	_	_	_	
single t non t - Wachannel	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \end{array}$		_	_	=
single t non $t-W$ -channel	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \end{array}$	_ _ _			
single t non $t-W$ -channel	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \end{array}$	= = =	_ _ _		
single t non $t-W$ -channel	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \end{array}$			_ _ _	ed on next page

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	_	_	_	 -
single t, s-channel, amcnlo pythia8		_	_	_	_
	1 lepton, from t	_	_	_	_
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$		-	<u> </u>	_
	Inclusve	21.46 ± 3.84	4.84 ± 1.47	2.02 ± 0.78	1.88 ± 0.92
	1 lepton	21.46 ± 3.84	4.84 ± 1.47	2.02 ± 0.78	1.88 ± 0.92
V+Jets	1 lepton, from W	21.46 ± 3.84	4.84 ± 1.47	2.02 ± 0.78	1.88 ± 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	_	_	_	_
	$Z \rightarrow \nu \nu$	_			_
				_	
	Inclusve	_	_	_	_
	1 lepton	_	_	_	_
DY+Jets→ ℓℓ, M50, amenlo pythia8	1 lepton, from W	_	_	_	_
	1 lepton, from t	_	_	_	_
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	21.46 ± 3.84	4.84 ± 1.47	2.02 ± 0.78	1.88 ± 0.92
	1 lepton	21.46 ± 3.84	4.84 ± 1.47	2.02 ± 0.78	1.88 ± 0.92
W+Jets $\rightarrow \ell \nu$	1 lepton, from W	21.46 ± 3.84	4.84 ± 1.47	2.02 ± 0.78	1.88 ± 0.92
W + 3C63 - 7 CD	1 lepton, from t	_	_	<u> </u>	_
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	-	_
	Inclusve	1.11 ± 1.11	_	_	0.70 ± 0.70
	1 lepton	1.11 ± 1.11	_	_	0.70 ± 0.70
W 1-4-	1 lepton, from W	1.11 ± 1.11	_	_	0.70 ± 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 ± 0.94	0.82 ± 0.58	0.55 ± 0.55
	1 lepton	7.83 ± 2.23	0.94 ± 0.94	0.82 ± 0.58	0.55 ± 0.55
	1 lepton, from W	7.83 ± 2.23	0.94 ± 0.94	0.82 ± 0.58 0.82 ± 0.58	0.55 ± 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 ± 0.43	_
					_
	1 lepton	8.45 ± 2.81	1.70 ± 1.00	0.43 ± 0.43	_
W+Jets $\rightarrow \ell \nu$, 400 < HT < 600, madgraph pythia8	1 lepton, from W	8.45 ± 2.81	1.70 ± 1.00	0.43 ± 0.43	_
. , , ,	1 lepton, from t	_	_	_	_
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$		<u> </u>	<u> </u>	
	Inclusve	1.49 ± 0.48	1.02 ± 0.28	0.45 ± 0.25	0.27 ± 0.19
	1 lepton	1.49 ± 0.48	1.02 ± 0.28	0.45 ± 0.25	0.27 ± 0.19
W+Jets $\rightarrow \ell \nu$, 600 < HT < 800, madgraph pythia8	1 lepton, from W	1.49 ± 0.48	1.02 ± 0.28	0.45 ± 0.25	0.27 ± 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 – conti	nued from previous pa			
		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
	T 1	1.58 ± 0.27	0.54 ± 0.14	0.17 ± 0.06	1
	Inclusve				0.28 ± 0.07
	1 lepton	1.58 ± 0.27	0.54 ± 0.14	0.17 ± 0.06	0.28 ± 0.07
W+Jets $\rightarrow \ell \nu$, 800 < HT < 1200, madgraph pythia8	1 lepton, from W	1.58 ± 0.27	0.54 ± 0.14	0.17 ± 0.06	0.28 ± 0.07
, ,	1 lepton, from t	_	_	_	_
	≥ 2 leptons		_	<u> </u>	_
	$Z \rightarrow \nu \nu$		_	_	_
	Inclusve	0.98 ± 0.58	0.59 ± 0.42	0.15 ± 0.10	0.06 ± 0.06
	1 lepton	0.98 ± 0.58	0.59 ± 0.42	0.15 ± 0.10	0.06 ± 0.06
l	1 lepton, from W	0.98 ± 0.58	0.59 ± 0.42	0.15 ± 0.10	0.06 ± 0.06
W+Jets $\rightarrow \ell \nu$, 1200 $<$ HT $<$ 2500, madgraph pythia8	1 lepton, from t				
	> 2 leptons				
	$Z \rightarrow \nu \nu$				
	Inclusve	0.03 ± 0.02	0.04 ± 0.02	0.00 ± 0.00	0.02 ± 0.01
	1 lepton	0.03 ± 0.02	0.04 ± 0.02	0.00 ± 0.00	0.02 ± 0.01
W+Jets $\rightarrow \ell \nu$, 2500 < HT < Inf, madgraph pythia8	1 lepton, from W	0.03 ± 0.02	0.04 ± 0.02	0.00 ± 0.00	0.02 ± 0.01
	1 lepton, from t	_	_	_	_
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$			<u> </u>	
	Inclusve	9.48 ± 1.10	2.82 ± 0.54	2.26 ± 0.62	0.66 ± 0.25
	1 lepton	1.54 ± 0.76	0.28 ± 0.09	0.42 ± 0.39	0.12 ± 0.04
_B	1 lepton, from W	1.54 ± 0.76	0.28 ± 0.09	0.42 ± 0.39	0.12 ± 0.04
Rare	1 lepton, from t	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	_
	> 2 leptons	1.98 ± 0.48	0.42 ± 0.23	0.23 ± 0.26	0.14 ± 0.11
	$Z \rightarrow \nu \nu$	5.97 ± 0.63	2.12 ± 0.48	1.61 ± 0.40	0.39 ± 0.22
	Inclusve	4.77 ± 1.08	1.24 ± 0.51	1.88 ± 0.62	0.39 ± 0.25
	1 lepton	1.54 ± 0.76	0.25 ± 0.09	0.42 ± 0.39	0.10 ± 0.04
	1 lepton, from W	1.54 ± 0.76 1.54 ± 0.76	0.25 ± 0.09 0.25 ± 0.09	0.42 ± 0.39 0.42 ± 0.39	0.10 ± 0.04 0.10 ± 0.04
diBoson		1.54 ± 0.76	0.25 ± 0.09	0.42 ± 0.39	0.10 ± 0.04
	1 lepton, from t	1.34 ± 0.44	0.20 ± 0.15	0.26 ± 0.26	0.13 ± 0.11
	≥ 2 leptons				
	$Z \rightarrow \nu \nu$	1.90 ± 0.63	0.78 ± 0.48	1.19 ± 0.40	0.16 ± 0.22
	Inclusve	2.31 ± 0.86	0.21 ± 0.15	0.65 ± 0.47	0.10 ± 0.10
	1 lepton	1.05 ± 0.75	_	0.39 ± 0.39	_
W W	1 lepton, from W	1.05 ± 0.75	_	0.39 ± 0.39	_
** **	1 lepton, from t	<u> </u>	_	<u> </u>	_
	≥ 2 leptons	1.26 ± 0.43	0.21 ± 0.15	0.26 ± 0.26	0.10 ± 0.10
	$Z \rightarrow \nu \nu$		_	_	_
	Inclusve	1.26 ± 0.43	0.21 ± 0.15	0.26 ± 0.26	0.10 ± 0.10
	1 lepton	<u>—</u>	_	_	_
	1 lepton, from W	<u>—</u>	_	_	
$WW \rightarrow 2\ell 2\nu$, powheg	1 lepton, from t	_	_	_	l –
	> 2 leptons	1.26 ± 0.43	0.21 ± 0.15	0.26 ± 0.26	0.10 ± 0.10
	$Z \rightarrow \nu \nu$		1 0.21 ± 0.10	1 0.20 ± 0.20	
	Inclusve	1.05 ± 0.75	_	0.39 ± 0.39	
	1 lepton	1.05 ± 0.75 1.05 ± 0.75		0.39 ± 0.39 0.39 ± 0.39	
	1 lepton 1 lepton, from W			0.39 ± 0.39 0.39 ± 0.39	_
$WW \rightarrow \ell \nu qq$, powheg		1.05 ± 0.75	_		_
	1 lepton, from t	_	_	_	_
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$		<u> </u>	<u> </u>	_
	Inclusve	2.41 ± 0.65	0.98 ± 0.48	1.21 ± 0.40	0.26 ± 0.22
	1 lepton	0.48 ± 0.14	0.25 ± 0.09	0.03 ± 0.04	0.10 ± 0.04
WZ	1 lepton, from W	0.48 ± 0.14	0.25 ± 0.09	0.03 ± 0.04	0.10 ± 0.04
W 2	1 lepton, from t	_	_	_	_
	≥ 2 leptons	0.09 ± 0.07	-0.01 ± 0.01	_	_
	$Z \rightarrow \nu \nu$	1.84 ± 0.63	0.73 ± 0.48	1.18 ± 0.40	0.15 ± 0.22
	Inclusve	0.10 ± 0.07	_	_	_
	1 lepton		_	_	_
	1 lepton, from W	_	_	_	_
$WZ\rightarrow 3\ell\nu$, powheg pythia8	1 lepton, from t	_	_	<u> </u>	_
	> 2 leptons	0.10 ± 0.07	_	_	
	$Z \rightarrow \nu \nu$	0.10 ± 0.07	_	_	
	$L \rightarrow \nu \nu$	_	_		ed on next page

Table 2 - continued from previous page

Sample Classification MTTW-200 MTTW-200 MTTW-200 MTW MTW Stropped MTTW-200 MTW MTW Stropped MTW St		Table 2 – contin	nued from previous pa			
			3jets	3jets	3jets	3jets
$WZ \rightarrow 2t2Q, \text{ amenlo pythias} \qquad \begin{array}{ c c c c c c c }\hline & & & & & & & & & & & & & & & & & & &$	Sample	Classification				$MT2W \ge 200$
			250 < MET < 350	350 < MET < 450	450 < MET < 550	MET > 550
		Inclusve	-0.01 ± 0.01	-0.01 + 0.01		
			0.01 ± 0.01	0.01 ± 0.01	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$WZ\rightarrow 2\ell 2Q$, amcnlo pythia8		_	_	_	_
$ T_{z} - \nu \nu Incluve 0.48 \pm 0.14 0.25 \pm 0.09 0.03 \pm 0.04 0.10 \pm 0.01 0.04 \pm 0.04 0.10 \pm 0.04 0.01 \pm 0.04 \pm 0.04 0.01 \pm 0.04 \pm 0.04 $			-0.01 + 0.01	-0.01 + 0.01		
$WZ - t \nu 2Q, \text{ amenlo pythia8} \qquad \begin{array}{ c c c c c c }\hline & \text{Inclusive} \\ & 1 \text{ lepton} \\ & 1 \text{ lepton} \\ & 1 \text{ lepton} \\ & 2Z + \nu \nu \\ & 1 \text{ lepton} \\ & 2Z + \nu \nu \\ & 1 \text{ lepton} \\ & 2Z + \nu \nu \\ & 1 \text{ lepton} \\ & 2Z + \nu \nu \\ & 1 \text{ lepton} \\ & 2Z + \nu \nu \\ & 1 \text{ lepton} \\ & 2Z + \nu \nu \\ & 1 \text{ lepton} \\ & 2Z + \nu \nu \\ & 1 \text{ lepton} \\ & 2Z + \nu \nu \\ & 1 \text{ lepton} \\ & 2Z + \nu \nu \\ & 1 \text{ lepton} \\ & 2Z + \nu \nu \\ & 1 \text{ lepton} \\ & 2Z + \nu \nu \\ & 1 \text{ lepton} \\ & 2Z + \nu \nu \\ & 1 \text{ lepton} \\ & 1 \text{ lepton} \\ & 1 \text{ lepton} \\ & 2Z + \nu \nu \\ & 1 \text{ lepton} \\ & 2Z + \nu \nu \\ & -0.01 \pm 0.01 \\ & -0.01 \pm 0.01 \\ & -0.01 \pm 0.01 \\ & -0.02 $			-0.01 ± 0.01	-0.01 ± 0.01	_	_
			0.48 ± 0.14	0.25 + 0.00	0.02 ± 0.04	0.10 ± 0.04
$ VZ \rightarrow t\nu 2Q, \text{ amenlo pythins} \\ VZ $						0.10 ± 0.04 0.10 ± 0.04
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$WZ \rightarrow \ell \nu 2Q$, amenlo pythia8		0.48 ± 0.14	0.25 ± 0.09	0.03 ± 0.04	0.10 ± 0.04
			_	_	_	_
$WZ \rightarrow 163\nu, \text{ amenlo pythia8} \\ Iepton 1 lepton 1 lepton $			_	_	_	_
			1.84 ± 0.63	0.73 ± 0.48	1.18 ± 0.40	0.15 ± 0.22
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$WZ \rightarrow 1\ell 3\nu$, amonlo pythia8		_	_	_	_
	=, amonio pyrinao		_	_	_	_
$ZZ = \frac{1 \text{ lichuse}}{2 \text{ lipton}} = \frac{1 \text{ lipton}}{1 \text{ lipton, from } W} = \frac{1}{1 \text{ lipton, from } W} = \frac{1 \text{ lipton, from } W}{1 \text{ lipton, from } W} = \frac{1}{1 \text{ lipton, from } $			l 	l	l -	l .
ZZ = 1 lepton, from W =						0.15 ± 0.22
$ ZZ = \frac{1 \ \text{lepton, from } W}{2 \ \text{lepton, from } W} = \frac{-}{2 \ \text{leptons}} = \frac{-0.01 \pm 0.01}{0.05 \pm 0.01} = \frac{-}{0.01 \pm 0.00} = \frac{-}{0.02 \pm 0.01} = \frac{-}{0$	<u> </u>		0.06 ± 0.02	0.05 ± 0.01	0.01 ± 0.00	0.03 ± 0.02
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	7.7	1 lepton, from W	_	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	22	1 lepton, from t	_	_	_	_
$ZZ \rightarrow 2\ell 2Q, \text{ amenlo pythia8} \\ \begin{array}{c} I \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ Z \rightarrow \nu V \\ \end{array} \\ \begin{array}{c} I \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 0.00 \pm 0.00 \\ 0.03 \pm 0.03 \\ 0.03 \pm 0.03 \\ 0.00 \pm 0.00 \\ 0.00 \pm 0$		≥ 2 leptons	-0.01 ± 0.01	_	_	0.02 ± 0.02
		$Z \rightarrow \nu \nu$	0.06 ± 0.01	0.05 ± 0.01	0.01 ± 0.00	0.01 ± 0.00
		Inclusve	-0.01 ± 0.01	_	_	0.02 ± 0.02
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		1 lepton	_	_	_	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ZZ\rightarrow 2\ell 2Q$, amcnlo pythia8		_	_	_	_
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			-0.01 ± 0.01	_	_	0.02 ± 0.02
$ ZZ \rightarrow 2\ell 2\nu \text{, powheg pythia8} \\ $			0.01 ± 0.01	_	_	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			0.06 ± 0.01	0.04 ± 0.01	0.01 ± 0.00	0.01 ± 0.00
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			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$			_	_	_	_
$ZZ \rightarrow 2Q2\nu, \mathrm{amenlo \; pythia8} \\ \begin{array}{c} & \text{Inclusve} \\ 1 \; \mathrm{lepton}, \mathrm{from} W \\ 2 \; 2 \; \mathrm{leptons} \\ Z \rightarrow \nu\nu \\ 1 \; \mathrm{lepton}, \mathrm{from} W \\ 1 \; \mathrm{lepton}, \mathrm{from} W \\ 1 \; \mathrm{lepton}, \mathrm{from} V \\ 2 \; 2 \; \mathrm{leptons} \\ 2 \; \mathrm{lepton} V \\ 2 \; 2 \; \mathrm{leptons} V \\ 2 \; 2 \; \mathrm{lepton} V \\ 2 \; 2 \; lepto$			0.06 ± 0.01	0.04 ± 0.01	0.01 ± 0.00	0.01 ± 0.00
$ZZ \rightarrow 2Q2\nu, \mathrm{amcnlo\;pythia8} \\ \begin{array}{c} 1 \mathrm{lepton} \\ 1 \mathrm{lepton}, \mathrm{from} $					0.01 ± 0.00	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			0.01 ± 0.01	0.01 ± 0.01	_	0.00 ± 0.00
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ZZ\rightarrow 2Q2\nu$, amcnlo pythia8		_	_	_	_
$t\bar{t} + V \qquad \begin{array}{ c c c c c c c c } \hline & Z \rightarrow \nu\nu & 0.01 \pm 0.01 & 0.01 \pm 0.01 & - & 0.00 \pm 0.00 \\ \hline & Inclusve & 4.71 \pm 0.21 & 1.58 \pm 0.18 & 0.38 \pm 0.04 & 0.26 \pm 0.00 \\ 1 & lepton & 0.000 \pm 0.00 & 0.03 \pm 0.03 & 0.00 \pm 0.00 & 0.02 \pm 0.00 \\ 1 & lepton, from W & - & 0.03 \pm 0.03 & - & 0.02 \pm 0.00 \\ 2 & lepton, from t & 0.00 \pm 0.00 & 0.00 \pm 0.00 & 0.00 \pm 0.00 \\ 2 & lepton & 0.64 \pm 0.20 & 0.22 \pm 0.17 & -0.03 \pm 0.03 & 0.02 \pm 0.00 \\ Z \rightarrow \nu\nu & 4.07 \pm 0.05 & 1.33 \pm 0.03 & 0.41 \pm 0.02 & 0.23 \pm 0.00 \\ 1 & lepton & - & 0.03 \pm 0.03 & 0.41 \pm 0.02 & 0.23 \pm 0.00 \\ 1 & lepton & - & 0.03 \pm 0.03 & - & 0.02 \pm 0.00 \\ 1 & lepton, from W & - & 0.03 \pm 0.03 & - & 0.02 \pm 0.00 \\ 2 & leptons & 0.61 \pm 0.20 & 0.24 \pm 0.17 & -0.03 \pm 0.03 & 0.02 \pm 0.00 \\ 2 & leptons & - & 0.03 \pm 0.03 & - & 0.02 \pm 0.00 \\ 2 & lepton & - & - & - & - & - & - \\ & & & & & & &$	- · · · · · · · · · · · · · · · · · · ·		_	_	_	_
$t\bar{t} + V \qquad \begin{array}{c} \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ 2 \text{ leptons} \\ 0.64 \pm 0.20 \\ 2 \text{ lepton} \\ 0.02 \pm 0.00 \\ 0.00 \pm 0.0$				0.01 0.01	_	
$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 \\ 1 \text{ lepton, from } t \\ 1 \text{ lepton, from } t \\ 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ 1 \text{ lepton, from } t \\ 2 \text{ leptons} \\ 2 \text{ leptons} \\ 2 \text{ leptons} \\ 4.07 \pm 0.05 \\ 1.33 \pm 0.03 \\ 0.02 \pm 0.17 \\ -0.03 \pm 0.03 \\ 0.02 \pm 0.17 \\ -0.03 \pm 0.03 \\ 0.02 \pm 0.02 \\ -0.03 \pm 0.03 \\ 0.02 \pm 0.02 \\ 0.02 \pm 0.17 \\ -0.03 \pm 0.03 \\ -0.02 \pm 0.02 \\ 0.02 \pm 0.17 \\ -0.03 \pm 0.03 \\ -0.02 \pm 0.02 \\ -0.02 \pm 0.02 \\ -0.03 \pm 0.03 \\ -0.02 \pm 0.02 \\ -0.03 \pm 0.03 \\ -0.02 \pm 0.03 \\ -0.03 \pm 0.03 \\ -0.02 \pm 0.03 \\ -0.03 \pm 0.03 \\ -0.02 \pm 0.03 \\ -0.03 \pm 0.03 \\ $						0.00 ± 0.00
$t\bar{t} + V \qquad \begin{array}{c} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \hline \\ t\bar{t} + W \end{array} \qquad \begin{array}{c} 0.03 \pm 0.03 \\ 0.00 \pm 0.00 $						0.26 ± 0.03
$t\bar{t} + V \\ & \begin{array}{c} 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ \bar{t} \bar{t} + W \\ \end{array} \\ & \begin{array}{c} 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ \hline \\ I \text{ lepton, from } V \\ \end{array} \\ & \begin{array}{c} 0.00 \pm 0.00 \\ 0.02 \pm 0.17 \\ 0.03 \pm 0.03 \\ 0.02 \pm 0.17 \\ 0.03 \pm 0.03 \\ 0.041 \pm 0.02 \\ 0.24 \pm 0.17 \\ -0.03 \pm 0.03 \\ 0.03 \pm 0.03 \\ - \\ 0.02 \pm 0.02 \pm 0.02 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ $			0.00 ± 0.00		0.00 ± 0.00	0.02 ± 0.02
$t\bar{t} + W \rightarrow \ell\nu \text{, amenlo pythia8} \\ \begin{vmatrix} 1 \text{ lepton, from } t \\ \ge 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \end{vmatrix} & 0.064 \pm 0.20 \\ 0.022 \pm 0.17 \\ 0.064 \pm 0.05 \\ 0.022 \pm 0.17 \\ 0.022 \pm 0.17 \\ 0.022 \pm 0.17 \\ 0.022 \pm 0.17 \\ 0.03 \pm 0.03 \\ 0.03 \pm 0.03 \\ 0.03 \pm 0.03 \\ 0.03 \pm 0.03 \\ 0.02 \pm 0.02 \pm 0.03 \\ 0.02 \pm 0.03 \\ 0.03 \pm 0.03 \\ 0.02 \pm 0.02 \pm 0.03 \\ 0.03 \pm 0.03 \\ 0.03 \pm 0.03 \\ 0.02 \pm 0.03 \\ 0.03 \pm 0.03$	$t\bar{t} + V$		l -		<u> </u>	0.02 ± 0.02
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	** 1 *					-
$t\bar{t} + W \qquad \begin{array}{c} \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \end{array} \qquad \begin{array}{c} 0.61 \pm 0.20 \\ -0.03 \pm 0.03 \\ -0.03 \pm 0.03 \\ -0.03 \pm 0.03 \\ -0.02 \pm 0.03 \\ -0.02 \pm 0.03 \\ -0.02 \pm 0.03 \\ -0.03 \pm 0.03 \\ -0.02 \pm 0.03 \\ -0.03 \pm 0.03 \\ -0.03 \pm 0.03 \\ -0.02 \pm 0.03 \\ -0.03 \pm 0.03 \\ -0.03 \pm 0.03 \\ -0.02 \pm 0.03 \\ -0.03 \pm 0.03 \\ -0.03 \pm 0.03 \\ -0.02 \pm 0.03 \\ -0.03 \pm 0.03 \\ -0.03 \pm 0.03 \\ -0.02 \pm 0.03 \\ -0.03 \pm 0.03 \\ -0.03 \pm 0.03 \\ -0.02 \pm 0.03 \\ -0.03 \pm 0.03 \\ -0.03 \pm 0.03 \\ -0.03 \pm 0.03 \\ -0.02 \pm 0.03 \\ -0.03 \pm 0$						0.02 ± 0.02
$t\bar{t} + W \qquad \begin{array}{ccccccccccccccccccccccccccccccccccc$		$Z \rightarrow \nu \nu$	4.07 ± 0.05	1.33 ± 0.03	0.41 ± 0.02	0.23 ± 0.01
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	<u> </u>	Inclusve	0.61 ± 0.20		-0.03 ± 0.03	0.03 ± 0.02
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		1 lepton	_	0.03 ± 0.03	_	0.02 ± 0.02
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	47 187	1 lepton, from W	_		_	0.02 ± 0.02
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	tt + vv		_	_	_	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			0.61 ± 0.20	0.22 ± 0.17	-0.03 ± 0.03	0.02 ± 0.02
$t\bar{t} + W \rightarrow \ell \nu \text{, amenlo pythia8} \\ \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 \end{array} \\ \begin{array}{c} 0.50 \pm 0.18 \\ - \\ 0.03 \pm 0.03 \\ - \\ 0.03 \pm 0.03 \\ - \\ 0.02 \pm 0.03 \\ - \\ 0.03 \pm 0.03 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ $						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			0.50 ± 0.18	0.23 ± 0.17	-0.03 ± 0.03	0.03 ± 0.02
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			I 0.00 ± 0.10			0.03 ± 0.02 0.02 ± 0.02
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$.=		_		_	0.02 ± 0.02 0.02 ± 0.02
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$tt + W \rightarrow \ell \nu$, amenlo pythia8		_	1	_	
Z ightarrow u u u u u u u u u u u u u			0.50 ± 0.18	0.20 ± 0.17	-0.03 + 0.03	0.02 ± 0.02
			1 0.00 ± 0.10		-0.00 ± 0.00	3.02 ± 0.02
Continued on nex		$Z \rightarrow \nu \nu$				

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 ± 0.10	0.02 ± 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 ± 0.10	0.02 ± 0.02	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	4.10 ± 0.06	1.34 ± 0.03	0.41 ± 0.02	0.23 ± 0.01
	1 lepton	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	_
$t\bar{t}+Z$	1 lepton, from W	_	_	_	_
tt + Z	1 lepton, from t	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	_
	≥ 2 leptons	0.03 ± 0.01	0.00 ± 0.00	0.00 ± 0.00	_
	$Z \rightarrow \nu \nu$	4.07 ± 0.05	1.33 ± 0.03	0.41 ± 0.02	0.23 ± 0.01
	Inclusve	4.10 ± 0.06	1.34 ± 0.03	0.41 ± 0.02	0.23 ± 0.01
	1 lepton	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	_
$t\bar{t} + Z$, madgraph	1 lepton, from W	_	_	_	_
tt + Z, madgraph	1 lepton, from t	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	_
	≥ 2 leptons	0.03 ± 0.01	0.00 ± 0.00	0.00 ± 0.00	_
	$Z \rightarrow \nu \nu$	4.07 ± 0.05	1.33 ± 0.03	0.41 ± 0.02	0.23 ± 0.01
	Inclusve	0.04 ± 0.08	0.02 ± 0.02	0.02 ± 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 ± 0.08	0.02 ± 0.02	0.02 ± 0.02	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	3.05 ± 0.42	1.40 ± 0.23	0.48 ± 0.12	0.27 ± 0.07
	1 lepton	_	_	_	_
$t\bar{t} + Z \rightarrow 2\ell 2\nu$, amenlo pythia8	1 lepton, from W	_	_	_	_
tt + 2 - 2c2v, amenio pytinao	1 lepton, from t	_	_	_	_
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	3.05 ± 0.42	1.40 ± 0.23	0.48 ± 0.12	0.27 ± 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/μ , MET	Inclusve	188.00 ± 13.71	43.00 ± 6.56	17.00 ± 4.12
	Inclusve	317.27 ± 6.04	48.88 ± 2.09	13.10 ± 0.93
	1 lepton	19.59 ± 2.73	3.25 ± 0.92	0.76 ± 0.25
All Background	1 lepton, from W	9.64 ± 2.22	1.71 ± 0.71	0.30 ± 0.10
III Bucaground	1 lepton, from t	9.95 ± 1.59	1.53 ± 0.57	0.46 ± 0.22
	≥ 2 leptons	290.11 ± 5.36	43.95 ± 1.87	12.00 ± 0.90
	$Z \rightarrow \nu \nu$	7.57 ± 0.46	1.69 ± 0.22	0.33 ± 0.09
	Inclusve	292.70 ± 5.28	45.06 ± 1.94	12.17 ± 0.92
	1 lepton 1 lepton, from W	8.17 ± 1.27	1.51 ± 0.57	0.44 ± 0.22
$tar{t}$	1 lepton, from t	8.17 ± 1.27	1.51 ± 0.57	0.44 ± 0.22
	≥ 2 leptons	284.53 ± 5.13	43.54 ± 1.86	11.72 ± 0.22
	$Z \rightarrow \nu \nu$		45.04 ± 1.00	
	Inclusve	3.24 ± 1.10	1.08 ± 0.54	0.19 ± 0.19
	1 lepton	3.24 ± 1.10 3.24 ± 1.10	1.08 ± 0.54 1.08 ± 0.54	0.19 ± 0.19
.=	1 lepton, from W			
$t\bar{t}$, single lepFromT, madgraph pythia8	1 lepton, from t	3.24 ± 1.10	1.08 ± 0.54	0.19 ± 0.19
	> 2 leptons			
	$Z \rightarrow \nu \nu$	_	_	-
	Inclusve	4.93 ± 0.63	0.43 ± 0.18	0.25 ± 0.11
	1 lepton	4.93 ± 0.63	0.43 ± 0.18	0.25 ± 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 ± 0.63	0.43 ± 0.18	0.25 ± 0.11
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$			
	Inclusve	284.53 ± 5.13	43.54 ± 1.86	11.72 ± 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 ± 1.86	11.72 ± 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 ± 0.95	_	_
	> 2 leptons	2.95 ± 1.48	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	4.58 ± 1.75	_	_
	1 lepton	1.63 ± 0.95	_	_
single $t \ t - W$ -channel	1 lepton, from W	_	_	-
single t t = W-channel	1 lepton, from t	1.63 ± 0.95	_	_
	≥ 2 leptons	2.95 ± 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 ± 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 ± 0.95	_	-
	≥ 2 leptons	2.95 ± 1.48	_	-
	$Z \rightarrow \nu \nu$	_	_	-
	Inclusve	0.10 ± 0.10	_	_
	1 lepton	0.10 ± 0.10	_	-
single t non $t - W$ -channel	1 lepton, from W	_	_	-
omate then t - W-channel	1 lepton, from t	0.10 ± 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 ± 0.10		
			_	_
	1 lepton	0.10 ± 0.10	_	_
single t, s-channel, amenlo pythia8	1 lepton, from W		_	_
	1 lepton, from t	0.10 ± 0.10	_	_
	\geq 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	-	-	_
	Inclusve	8.67 ± 2.14	1.65 ± 0.71	0.27 ± 0.09
	1 lepton	8.67 ± 2.14	1.65 ± 0.71	0.27 ± 0.09
	1 lepton, from W	8.67 ± 2.14	1.65 ± 0.71	0.27 ± 0.09
V+Jets	1 lepton, from t			
	> 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$			
	Inclusve			
		_	_	
	1 lepton	-	_	_
$DY+Jets \rightarrow \ell\ell$	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	_		_
		-	_	_
	$Z \rightarrow \nu \nu$			_
	Inclusve		_	_
	1 lepton	_	_	_
DY+Jets→ ℓℓ, M50, amcnlo pythia8	1 lepton, from W	-	_	_
D1 ∓Jets→ εε, MJO, amenio pytinas	1 lepton, from t	_	_	_
	> 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	8.67 ± 2.14	1.65 ± 0.71	0.27 ± 0.09
	1 lepton	8.67 ± 2.14	1.65 ± 0.71	0.27 ± 0.09
	1 lepton, from W	8.67 ± 2.14	1.65 ± 0.71	0.27 ± 0.09
W+Jets $\rightarrow \ell \nu$	1 lepton, from t	8.07 ± 2.14	1.03 ± 0.71	0.27 ± 0.09
		-	_	_
	≥ 2 leptons	-	_	_
	$Z \rightarrow \nu \nu$			
	Inclusve	_	_	_
	1 lepton	_	_	_
W+Jets $\rightarrow \ell \nu$, 100 < HT < 200, madgraph pythia8	1 lepton, from W	-		_
** + 3005 - cv, 100 < 111 < 200, maugraph pythias	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	2.05 ± 1.20	0.48 ± 0.48	
	1 lepton	2.05 ± 1.20	0.48 ± 0.48	_
	1 lepton, from W	2.05 ± 1.20 2.05 ± 1.20	0.48 ± 0.48 0.48 ± 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	_	_	_
	$Z \rightarrow \nu \nu$			
	Inclusve	3.76 ± 1.69	0.48 ± 0.48	_
	1 lepton	3.76 ± 1.69	0.48 ± 0.48	-
W. I-t- # 400 < HT < 600 1 11 0	1 lepton, from W	3.76 ± 1.69	0.48 ± 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		0.08 + 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 ± 0.17	0.53 ± 0.21	0.08 ± 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 ± 0.17	0.53 ± 0.21	0.08 ± 0.08
W+Jets $\rightarrow \ell \nu,600 < HT < 800,{ m madgraph}$ pythia 8		0.42 ± 0.17	0.53 ± 0.21	0.08 ± 0.08
W+Jets $\rightarrow \ell \nu, 600 < HT < 800, { m madgraph pythia8}$		0.42 ± 0.17	$\begin{array}{c} 0.53 \pm 0.21 \\ 0.53 \pm 0.21 \\ \\ - \\ \\ - \\ \end{array}$	0.08 ± 0.08

Table 3 - continued from previous 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	1.08 ± 0.17	0.15 ± 0.06	0.18 ± 0.05		
	1 lepton	1.08 ± 0.17	0.15 ± 0.06	0.18 ± 0.05		
W+Jets $\rightarrow \ell \nu$, 800 < HT < 1200, madgraph pythia8	1 lepton, from W	1.08 ± 0.17	0.15 ± 0.06	0.18 ± 0.05		
	1 lepton, from t					
	> 2 leptons	_	_	_		
	$Z \rightarrow \nu \nu$	_	_	_		
	Inclusve	1.36 ± 0.49		_		
	1 lepton	1.36 ± 0.49	_	_		
	1 lepton, from W	1.36 ± 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 ± 0.01	0.01 ± 0.00	0.01 ± 0.01		
	1 lepton	0.01 ± 0.01	0.01 ± 0.00	0.01 ± 0.01		
*****	1 lepton, from W	0.01 ± 0.01	0.01 ± 0.00	0.01 ± 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 ± 0.93	2.18 ± 0.30	0.66 ± 0.15		
	1 lepton	1.02 ± 0.59	0.08 ± 0.05	0.05 ± 0.04		
D	1 lepton, from W	0.97 ± 0.59	0.06 ± 0.05	0.03 ± 0.04		
Rare	1 lepton, from t	0.05 ± 0.04	0.02 ± 0.01	0.02 ± 0.02		
	≥ 2 leptons	2.63 ± 0.55	0.40 ± 0.20	0.28 ± 0.12		
	$Z \rightarrow \nu \nu$	7.57 ± 0.46	1.69 ± 0.22	0.33 ± 0.09		
	Inclusve	2.44 ± 0.80	0.47 ± 0.23	0.05 ± 0.09		
	1 lepton	0.92 ± 0.59	0.06 ± 0.05	0.03 ± 0.04		
diBoson	1 lepton, from W	0.92 ± 0.59	0.06 ± 0.05	0.03 ± 0.04		
diboson	1 lepton, from t	_	_	_		
	≥ 2 leptons	0.61 ± 0.30	_	_		
	$Z \rightarrow \nu \nu$	0.91 ± 0.45	0.41 ± 0.22	0.02 ± 0.09		
	Inclusve	1.08 ± 0.65	_	_		
	1 lepton	0.58 ± 0.58	_	_		
WW	1 lepton, from W	0.58 ± 0.58	_	_		
VV VV	1 lepton, from t	_	_	_		
	≥ 2 leptons	0.50 ± 0.29	_	_		
	$Z \rightarrow \nu \nu$	_	_	_		
	Inclusve	0.50 ± 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 ± 0.29	_	_		
	$Z \rightarrow \nu \nu$	_	_	_		
	Inclusve	0.58 ± 0.58	_			
	1 lepton	0.58 ± 0.58	_	_		
$WW \rightarrow \ell \nu qq$, powheg	1 lepton, from W	0.58 ± 0.58	_	_		
11, Роппов	1 lepton, from t	_	_	_		
	≥ 2 leptons	_	_	_		
	$Z \rightarrow \nu \nu$	_	_	_		
	Inclusve	1.33 ± 0.47	0.45 ± 0.23	0.04 ± 0.09		
	1 lepton	0.34 ± 0.11	0.06 ± 0.05	0.03 ± 0.04		
WZ	1 lepton, from W	0.34 ± 0.11	0.06 ± 0.05	0.03 ± 0.04		
*** **	1 lepton, from t	_	_	_		
	≥ 2 leptons	0.11 ± 0.08	-	_		
	$Z \rightarrow \nu \nu$	0.88 ± 0.45	0.39 ± 0.22	0.01 ± 0.09		
	Inclusve	0.11 ± 0.08		_		
	1 lepton	_	_	_		
$WZ \rightarrow 3\ell\nu$, powheg pythia8	1 lepton, from W	_	_	_		
=, Formes Pjenne	1 lepton, from t		_	_		
		0.11 ± 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	nage	

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 ± 0.01	_	_		
	1 lepton	_	_	_		
$WZ \rightarrow 2\ell 2Q$, amcnlo pythia8	1 lepton, from W	_	_	_		
	1 lepton, from t		_	_		
	≥ 2 leptons	0.00 ± 0.01	_	_		
	$Z \rightarrow \nu \nu$	-				
	Inclusve	0.34 ± 0.11	0.06 ± 0.05	0.03 ± 0.04		
	1 lepton	0.34 ± 0.11	0.06 ± 0.05	0.03 ± 0.04		
$WZ \rightarrow \ell \nu 2Q$, amenlo pythia8	1 lepton, from W	0.34 ± 0.11	0.06 ± 0.05	0.03 ± 0.04		
	1 lepton, from t > 2 leptons	_	_	_		
	$Z \rightarrow \nu \nu$	_	_	_		
	Inclusve	0.88 ± 0.45	0.39 ± 0.22	0.01 ± 0.09		
	1 lepton	0.88 ± 0.43	0.39 ± 0.22	0.01 ± 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 ± 0.45	0.39 ± 0.22	0.01 ± 0.09		
	Inclusve	0.03 ± 0.02	0.02 ± 0.01	0.00 ± 0.00		
	1 lepton					
	1 lepton, from W	_	_	_		
ZZ	1 lepton, from t	_	_	_		
	> 2 leptons	0.00 ± 0.01	_	_		
	$Z \rightarrow \nu \nu$	0.03 ± 0.02	0.02 ± 0.01	0.00 ± 0.00		
	Inclusve	0.00 ± 0.01				
	1 lepton	_	_	_		
77 .2/20	1 lepton, from W	_	_	_		
$ZZ\rightarrow 2\ell 2Q$, amcnlo pythia8	1 lepton, from t	_	_	_		
	≥ 2 leptons	0.00 ± 0.01	_	_		
	$Z \rightarrow \nu \nu$	_		_		
	Inclusve	0.03 ± 0.01	0.01 ± 0.00	0.00 ± 0.00		
	1 lepton	_	_	_		
$ZZ\rightarrow 2\ell 2\nu$, powheg pythia8	1 lepton, from W	_	_	_		
22 · 2c2r, powneg pytmae	1 lepton, from t	_	_	_		
	≥ 2 leptons	-				
	$Z \rightarrow \nu \nu$	0.03 ± 0.01	0.01 ± 0.00	0.00 ± 0.00		
	Inclusve	-0.00 ± 0.02	0.00 ± 0.00	_		
	1 lepton	_	_	_		
$ZZ\rightarrow 2Q2\nu$, amcnlo pythia8	1 lepton, from W	_	_	_		
	1 lepton, from t	_	_	_		
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	-0.00 ± 0.02	0.00 ± 0.00	_		
	$Z \rightarrow \nu\nu$ Inclusve	8.78 ± 0.47	0.00 ± 0.00 1.71 ± 0.20	0.61 ± 0.12		
	1 lepton	8.78 ± 0.47 0.09 ± 0.05	0.02 ± 0.01	0.61 ± 0.12 0.02 ± 0.02		
	1 lepton W	0.09 ± 0.05 0.05 ± 0.03	0.02 ± 0.01	0.02 ± 0.02		
$t\bar{t} + V$	1 lepton, from t	0.05 ± 0.03 0.05 ± 0.04	0.02 ± 0.01	0.02 ± 0.02		
	> 2 leptons	2.02 ± 0.46	0.02 ± 0.01 0.40 ± 0.20	0.02 ± 0.02 0.28 ± 0.12		
	$Z \rightarrow \nu \nu$	6.66 ± 0.07	1.29 ± 0.03	0.28 ± 0.12 0.32 ± 0.01		
	Inclusve	1.99 ± 0.47	0.40 ± 0.20	0.32 ± 0.01 0.29 ± 0.12		
	1 lepton	0.06 ± 0.05	0.40 ± 0.20 0.01 ± 0.01	0.02 ± 0.02		
. 	1 lepton, from W	0.05 ± 0.03	- 0.01 -			
$t\bar{t}+W$	1 lepton, from t	0.03 ± 0.03 0.01 ± 0.04	0.01 ± 0.01	0.02 ± 0.02		
	> 2 leptons	1.93 ± 0.46	0.39 ± 0.20	0.27 ± 0.02		
	$Z \rightarrow \nu \nu$					
	Inclusve	1.32 ± 0.43	0.23 ± 0.18	0.19 ± 0.11		
	1 lepton	0.05 ± 0.03				
$t\bar{t} + W \rightarrow \ell\nu$, amenlo pythia8	1 lepton, from W	0.05 ± 0.03	_	_		
$tt + w \rightarrow \epsilon \nu$, amenio pythias	1 lepton, from t	_				
$\iota\iota\iota + w \to \iota\nu$, amenio pytinas	1 lepton, from t ≥ 2 leptons	1.27 ± 0.43	0.23 ± 0.18	0.19 ± 0.11		
$\iota\iota \iota + w \to \iota\nu$, amenio pytinas			0.23 ± 0.18	0.19 ± 0.11		

Table 3 - continued from previous page

Table 3 – continued from previous page						
Sample	Classification	\geq 4 jets MT2W < 200 250 < MET < 350	\geq 4 jets MT2W < 200 350 < MET < 450	\geq 4jets MT2W< 200 MET > 450		
$t \bar t + W \! ightharpoonup \! Q Q$, amenlo pythia 8	Inclusve 1 lepton 1 lepton, from W 1 lepton, from t ≥ 2 leptons $Z \rightarrow \nu \nu$	$\begin{array}{c} 0.66 \pm 0.19 \\ 0.01 \pm 0.04 \\ - \\ 0.01 \pm 0.04 \\ 0.65 \pm 0.18 \\ - \end{array}$	$\begin{array}{c} 0.16 \pm 0.09 \\ 0.01 \pm 0.01 \\$	$\begin{array}{c} 0.10 \pm 0.05 \\ 0.02 \pm 0.02 \\$		
$tar{t}+Z$	Inclusve 1 lepton 1 lepton, from W 1 lepton, from t \geq 2 leptons $Z \rightarrow \nu \nu$	$\begin{array}{c} 6.79 \pm 0.07 \\ 0.03 \pm 0.00 \\$	$\begin{array}{c} 1.31 \pm 0.03 \\ 0.01 \pm 0.00 \\$	$\begin{array}{c} 0.33 \pm 0.01 \\$		
$tar{t}+Z,$ 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 pythia 8	Inclusve 1 lepton 1 lepton, from W 1 lepton, from t \geq 2 leptons $Z \rightarrow \nu \nu$	$\begin{array}{c} 0.67 \pm 0.32 \\ 0.05 \pm 0.06 \\ - \\ 0.05 \pm 0.06 \\ 0.62 \pm 0.31 \\ - \end{array}$	0.33 ± 0.13 — — 0.33 ± 0.13 —	$\begin{array}{c} 0.03 \pm 0.07 \\ -0.03 \pm 0.03 \\ -0.03 \pm 0.03 \\ -0.06 \pm 0.06 \\ -0.06 \pm 0.06 \end{array}$		
$t ar t + Z \! ightarrow \! 2 \ell 2 u,$ amenlo pythia 8	Inclusve 1 lepton 1 lepton, from W 1 lepton, from t \geq 2 leptons $Z \rightarrow \nu \nu$	7.08 ± 0.71	1.52 ± 0.34 0.15 ± 0.11 1.66 ± 0.32	0.75 ± 0.18 $ 0.01 \pm 0.01$ 0.74 ± 0.18		

SR, Nominal Systematic, Yield Table for Input Samples

SR, Nominal Systematic, Yield Table for Input Samples						
		≥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
Data, single e/µ, MET	Inclusve	61.00 ± 7.81	22.00 ± 4.69	6.00 ± 2.45	1.00 ± 1.00	6.00 ± 2.45
, , , , ,	Inclusve	00 70 1 4 00	00.00 0.17	0.07 1.50	0.07 0.70	
		86.78 ± 4.26 20.70 ± 2.92	29.00 ± 2.17 8.19 ± 1.52	9.67 ± 1.53 3.26 ± 1.01	2.87 ± 0.78 0.77 ± 0.29	2.43 ± 0.54 1.33 ± 0.37
	1 lepton		8.19 ± 1.52 6.32 + 1.39	3.26 ± 1.01 3.21 + 1.01		1.33 ± 0.37 1.16 ± 0.36
All Background	1 lepton, from W	16.30 ± 2.80			0.77 ± 0.29	
	1 lepton, from t	4.39 ± 0.85	1.86 ± 0.62	0.05 ± 0.05		0.17 ± 0.09
	≥ 2 leptons	59.27 ± 3.07	16.36 ± 1.45	4.95 ± 1.08	1.51 ± 0.69	0.88 ± 0.34
	$Z \rightarrow \nu \nu$	6.81 ± 0.46	4.45 ± 0.55	1.46 ± 0.39	0.59 ± 0.23	0.21 ± 0.19
	Inclusve	55.98 ± 2.47	16.94 ± 1.46	3.82 ± 0.65	0.78 ± 0.27	0.63 ± 0.22
	1 lepton	4.33 ± 0.84	1.86 ± 0.62	0.05 ± 0.05		0.17 ± 0.09
$t\bar{t}$	1 lepton, from W					
	1 lepton, from t	4.33 ± 0.84	1.86 ± 0.62	0.05 ± 0.05	.	0.17 ± 0.09
	≥ 2 leptons	51.65 ± 2.33	15.08 ± 1.32	3.77 ± 0.64	0.78 ± 0.27	0.46 ± 0.20
	$Z \rightarrow \nu \nu$	_	_	_		_
	Inclusve	1.62 ± 0.68	1.01 ± 0.52	_	_	_
	1 lepton	1.62 ± 0.68	1.01 ± 0.52	_	_	_
tt, single lepFromT, madgraph pythia8	1 lepton, from W	<u> </u>	_	_	_	_
o, omgre reprionir, madgraph pythiao	1 lepton, from t	1.62 ± 0.68	1.01 ± 0.52	_	_	_
	≥ 2 leptons	_	_	_	_	_
	$Z \rightarrow \nu \nu$	_		<u> </u>	<u> </u>	
	Inclusve	2.71 ± 0.49	0.85 ± 0.35	0.05 ± 0.05		0.17 ± 0.09
	1 lepton	2.71 ± 0.49	0.85 ± 0.35	0.05 ± 0.05	_	0.17 ± 0.09
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	1 lepton, from W	_	_	_	-	_
tt, single leprrom i bar, madgraphi pythias, exti	1 lepton, from t	2.71 ± 0.49	0.85 ± 0.35	0.05 ± 0.05	_	0.17 ± 0.09
	≥ 2 leptons	_	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_	_
	Inclusve	51.65 ± 2.33	15.08 ± 1.32	3.77 ± 0.64	0.78 ± 0.27	0.46 ± 0.20
	1 lepton	_	_	_	-	
tt, diLepton, madgraph pythia8, ext1	1 lepton, from W	_	_	_	-	_
tt, dibepton, madgraph pytmas, extr	1 lepton, from t	_	_	_	_	_
	\geq 2 leptons	51.65 ± 2.33	15.08 ± 1.32	3.77 ± 0.64	0.78 ± 0.27	0.46 ± 0.20
	$Z \rightarrow \nu \nu$	_	_	_	_	_
	Inclusve	5.84 ± 2.12	1.23 ± 0.87	0.85 ± 0.85	0.63 ± 0.63	0.28 ± 0.28
	1 lepton	0.86 ± 0.86	0.70 ± 0.70	_	_	_
single t	1 lepton, from W	0.86 ± 0.86	0.70 ± 0.70	_	_	_
single t	1 lepton, from t	l —	_	_	_	_
	\geq 2 leptons	4.98 ± 1.94	0.53 ± 0.53	0.85 ± 0.85	0.63 ± 0.63	0.28 ± 0.28
	$Z \rightarrow \nu \nu$	_	_	_		_
	Inclusve	5.84 ± 2.12	1.23 ± 0.87	0.85 ± 0.85	0.63 ± 0.63	0.28 ± 0.28
	1 lepton	0.86 ± 0.86	0.70 ± 0.70	_	_	_
single t t – W -channel	1 lepton, from W	0.86 ± 0.86	0.70 ± 0.70	_	_	_
	1 lepton, from t	-	_	-		_
	≥ 2 leptons	4.98 ± 1.94	0.53 ± 0.53	0.85 ± 0.85	0.63 ± 0.63	0.28 ± 0.28
	$Z \rightarrow \nu \nu$	_	_	_		_
	Inclusve	_	_	_	_	
	1 lepton	_	_	_	_	_
single t , $t - W$ -channel, powheg pythia8	1 lepton, from W	_	_	_	_	_
	1 lepton, from t	_	_	_	_	_
	≥ 2 leptons	_	_	_	_	_
	$Z \rightarrow \nu \nu$	<u> </u>	<u> </u>	<u> </u>		_
	Inclusve	5.84 ± 2.12	1.23 ± 0.87	0.85 ± 0.85	0.63 ± 0.63	0.28 ± 0.28
	1 lepton	0.86 ± 0.86	0.70 ± 0.70	_	_	_
single \bar{t} , $t - W$ -channel, powheg pythia8	1 lepton, from W	0.86 ± 0.86	0.70 ± 0.70	_	_	_
single s, s = w -channel, powneg pythiao	1 lepton, from t	l -	l 	l 		
	≥ 2 leptons	4.98 ± 1.94	0.53 ± 0.53	0.85 ± 0.85	0.63 ± 0.63	0.28 ± 0.28
	$Z \rightarrow \nu \nu$		_	_		_
	Inclusve	_	_	_	_	_
	1 lepton	_	_	_	_	_
single t non $t - W$ -channel	1 lepton, from W	_	_	_	_	_
	1 lepton, from t	_	_	_	_	_
	≥ 2 leptons	_	_	_	_	_
	$Z \rightarrow \nu \nu$			_		
					Continue	ed on next page

Table 4 – continued from previous page

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					
	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	14.43 ± 2.62	5.42 ± 1.19	3.12 ± 1.01	0.74 ± 0.28	1.17 ± 0.36
	1 lepton	14.43 ± 2.62	5.42 ± 1.19	3.12 ± 1.01	0.74 ± 0.28	1.17 ± 0.36
$V + \mathrm{Jets}$	1 lepton, from W	14.43 ± 2.62	5.42 ± 1.19	3.12 ± 1.01	0.74 ± 0.28	1.17 ± 0.36
V T Sets	1 lepton, from t	_	_	-	-	_
	≥ 2 leptons	_	_	-	-	_
	$Z \rightarrow \nu \nu$	_	_	<u> </u>	_	_
	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	_		_		_
		_	_	-	-	
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	_	_			
			_			
	Inclusve	_	_	_	_	_
	1 lepton	_	_			
DY+Jets→ ℓℓ, M50, amcnlo pythia8	1 lepton, from W	_	_	-	-	_
* **	1 lepton, from t	_	_	-	-	_
	≥ 2 leptons	_	_	-	_	_
	$Z \rightarrow \nu \nu$		<u> </u>	-		_
	Inclusve	14.43 ± 2.62	5.42 ± 1.19	3.12 ± 1.01	0.74 ± 0.28	1.17 ± 0.36
	1 lepton	14.43 ± 2.62	5.42 ± 1.19	3.12 ± 1.01	0.74 ± 0.28	1.17 ± 0.36
W+Jets $\rightarrow \ell \nu$	1 lepton, from W	14.43 ± 2.62	5.42 ± 1.19	3.12 ± 1.01	0.74 ± 0.28	1.17 ± 0.36
** 0000 - 00	1 lepton, from t	_	_	_	_	_
	≥ 2 leptons	_	_	-	-	_
	$Z \rightarrow \nu \nu$	_	_	_	-	_
	Inclusve	1.46 ± 1.46	_	_		_
	1 lepton	1.46 ± 1.46	_	_	_	_
W+Jets $\rightarrow \ell \nu$, 100 < HT < 200, madgraph pythia8	1 lepton, from W	1.46 ± 1.46	_	_	_	_
w ⊤Jets→ εν, 100 < n1 < 200, madgraph pythia8	1 lepton, from t	_	_	_	_	_
	≥ 2 leptons	_	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_	_
	Inclusve	3.12 ± 1.42	_	0.61 ± 0.61		_
	1 lepton	3.12 ± 1.42	_	0.61 ± 0.61	_	_
W. I	1 lepton, from W	3.12 ± 1.42	_	0.61 ± 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 ± 1.41	1.38 ± 0.80	0.66 ± 0.66		_
	1 lepton	3.11 ± 1.41	1.38 ± 0.80	0.66 ± 0.66	_	_
	1 lepton, from W	3.11 ± 1.41	1.38 ± 0.80	0.66 ± 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 ± 0.14
	1 lepton	2.27 ± 0.51 2.27 ± 0.51	1.70 ± 0.50 1.70 ± 0.50	0.76 ± 0.32 0.76 ± 0.32	0.06 ± 0.06 0.06 ± 0.06	0.28 ± 0.14 0.28 ± 0.14
	1 lepton 1 lepton, from W	2.27 ± 0.51 2.27 ± 0.51	1.70 ± 0.50 1.70 ± 0.50	0.76 ± 0.32 0.76 ± 0.32	0.06 ± 0.06 0.06 ± 0.06	0.28 ± 0.14 0.28 ± 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
	≥ 2 leptons	_	_	_	_	
	$Z \rightarrow \nu \nu$		_	_	_	
	$Z \rightarrow \nu \nu$					
1					Continu	ed on next page

Table 4 – continued from previous page

Table 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	2.88 ± 0.31	1.09 ± 0.18	0.49 ± 0.13	0.20 ± 0.09	0.41 ± 0.09
		2.88 ± 0.31			0.20 ± 0.09 0.20 ± 0.09	0.41 ± 0.09 0.41 ± 0.09
	1 lepton		1.09 ± 0.18	0.49 ± 0.13		
W+Jets $\rightarrow \ell \nu$, 800 $< HT < 1200$, madgraph pythia8	1 lepton, from W	2.88 ± 0.31	1.09 ± 0.18	0.49 ± 0.13	0.20 ± 0.09	0.41 ± 0.09
	1 lepton, from t	_	_	_	_	_
	≥ 2 leptons	_	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_	_
	Inclusve	1.41 ± 0.58	1.17 ± 0.71	0.54 ± 0.30	0.46 ± 0.26	0.46 ± 0.32
	1 lepton	1.41 ± 0.58	1.17 ± 0.71	0.54 ± 0.30	0.46 ± 0.26	0.46 ± 0.32
	1 lepton, from W	1.41 ± 0.58	1.17 ± 0.71	0.54 ± 0.30	0.46 ± 0.26	0.46 ± 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 ± 0.03	0.07 ± 0.02	0.06 ± 0.02	0.02 ± 0.01	0.02 ± 0.01
	1 lepton	0.19 ± 0.03	0.07 ± 0.02 0.07 ± 0.02	0.06 ± 0.02 0.06 ± 0.02	0.02 ± 0.01 0.02 + 0.01	0.02 ± 0.01 0.02 + 0.01
W+Jets $\rightarrow \ell \nu$, 2500 $< HT < Inf$, madgraph pythia8	1 lepton, from W	0.19 ± 0.03	0.07 ± 0.02	0.06 ± 0.02	0.02 ± 0.01	0.02 ± 0.01
, , , , , , , , , , , , , , , , , , , ,	1 lepton, from t	_	_	_	_	_
	≥ 2 leptons	_	_	_	_	_
	$Z \rightarrow \nu \nu$		<u> </u>	_	<u> </u>	
	Inclusve	10.54 ± 0.83	5.42 ± 0.62	1.88 ± 0.43	0.71 ± 0.24	0.35 ± 0.20
	1 lepton	1.08 ± 0.50	0.21 ± 0.11	0.10 ± 0.08	0.03 ± 0.04	-0.00 ± 0.02
Rare	1 lepton, from W	1.02 ± 0.50	0.21 ± 0.11	0.09 ± 0.08	0.03 ± 0.04	-0.00 ± 0.02
nare	1 lepton, from t	0.06 ± 0.03	0.01 ± 0.00	0.00 ± 0.00	_	0.00 ± 0.00
	> 2 leptons	2.65 ± 0.48	0.75 ± 0.26	0.33 ± 0.16	0.09 ± 0.07	0.14 ± 0.06
	$Z \rightarrow \nu \nu$	6.81 ± 0.46	4.45 ± 0.55	1.46 ± 0.39	0.59 ± 0.23	0.21 ± 0.19
	Inclusve	2.26 ± 0.73	2.20 ± 0.57	0.76 ± 0.42	0.29 ± 0.23	0.08 ± 0.19
	1 lepton	0.87 ± 0.49	0.29 ± 0.10	0.13 ± 0.06	0.01 ± 0.04	-0.00 ± 0.02
	1 lepton, from W	0.87 ± 0.49	0.29 ± 0.10	0.13 ± 0.06	0.01 ± 0.04	-0.00 ± 0.02
diBoson	1 lepton, from t	0.57 ± 0.45	0.25 ± 0.10	0.13 ± 0.00	0.01 ± 0.04	-0.00 ± 0.02
	> 2 leptons	0.61 ± 0.28	0.11 ± 0.10	0.13 ± 0.13		0.01 ± 0.01
	$Z \rightarrow \nu \nu$	0.01 ± 0.28 0.77 ± 0.46	1.81 ± 0.55	0.13 ± 0.13 0.50 ± 0.39	0.28 ± 0.22	0.01 ± 0.01 0.07 ± 0.19
		0.77 ± 0.46 0.94 ± 0.55			0.28 ± 0.22	0.07 ± 0.19
	Inclusve		0.10 ± 0.10	0.13 ± 0.13	_	_
	1 lepton	0.48 ± 0.48	_	_	_	_
WW	1 lepton, from W	0.48 ± 0.48	_	_	_	_
	1 lepton, from t	_	-	_	_	_
	≥ 2 leptons	0.46 ± 0.27	0.10 ± 0.10	0.13 ± 0.13	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_	_
	Inclusve	0.46 ± 0.27	0.10 ± 0.10	0.13 ± 0.13	_	_
	1 lepton	_	_	_	_	_
$WW \rightarrow 2\ell 2\nu$, powheg	1 lepton, from W	_	_	_	_	_
$vv \ vv \rightarrow 2\varepsilon 2\nu$, powneg	1 lepton, from t	_	_	_	_	_
	> 2 leptons	0.46 ± 0.27	0.10 ± 0.10	0.13 ± 0.13	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_	_
	Inclusve	0.48 ± 0.48	_	_	_	
	1 lepton	0.48 ± 0.48	l <u> </u>	_	_	_
	1 lepton, from W	0.48 ± 0.48	_	_	_	_
$WW \rightarrow \ell \nu qq$, powheg	1 lepton, from t	0.40 ± 0.40	_	_	_	
	> 2 leptons		_	_		
	$Z \rightarrow \nu \nu$	_	_	_	_	_
	Inclusve	1.26 ± 0.48	2.08 ± 0.56	0.61 ± 0.39	0.29 ± 0.23	0.07 ± 0.19
	1 lepton	0.40 ± 0.13	0.29 ± 0.10	0.13 ± 0.06	0.01 ± 0.04	-0.00 ± 0.02
WZ	1 lepton, from W	0.40 ± 0.13	0.29 ± 0.10	0.13 ± 0.06	0.01 ± 0.04	-0.00 ± 0.02
W #	1 lepton, from t	_	_	_	_	_
	\geq 2 leptons	0.12 ± 0.09	0.01 ± 0.01	_	_	-
	$Z \rightarrow \nu \nu$	0.73 ± 0.46	1.78 ± 0.55	0.48 ± 0.39	0.28 ± 0.22	0.07 ± 0.19
	Inclusve	0.11 ± 0.08				_
	1 lepton	_	_	_	_	_
W7 04 1 41 0	1 lepton, from W	_	_	_	_	_
$WZ \rightarrow 3\ell\nu$, powheg pythia8	1 lepton, from t	_	_	_	_	_
	≥ 2 leptons	0.11 ± 0.08	_	_	_	_
	$Z \rightarrow \nu \nu$		_	_	_	_
		I .		I	Continu	ed on next page
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Table 4 – 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	0.01 ± 0.01	0.01 ± 0.01	_	_	_			
	1 lepton	_	_	_	_	_			
$WZ \rightarrow 2\ell 2Q$, amenlo pythia8	1 lepton, from W	_	_	_	_	_			
• ,	1 lepton, from t	0.01 ± 0.01		_	_	_			
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	0.01 ± 0.01	0.01 ± 0.01	_	-	_			
	$Z \rightarrow \nu\nu$ Inclusve	0.40 ± 0.13	0.29 ± 0.10	0.13 ± 0.06	0.01 ± 0.04	-0.00 ± 0.02			
	1 lepton	0.40 ± 0.13 0.40 ± 0.13	0.29 ± 0.10 0.29 ± 0.10	0.13 ± 0.06	0.01 ± 0.04 0.01 ± 0.04	-0.00 ± 0.02 -0.00 ± 0.02			
	1 lepton, from W	0.40 ± 0.13	0.29 ± 0.10 0.29 ± 0.10	0.13 ± 0.06	0.01 ± 0.04 0.01 ± 0.04	-0.00 ± 0.02			
$WZ \rightarrow \ell \nu 2Q$, amenlo pythia8	1 lepton, from t								
	> 2 leptons	_	_	_	_	_			
	$Z \rightarrow \nu \nu$	_	_	_	_	_			
	Inclusve	0.73 ± 0.46	1.78 ± 0.55	0.48 ± 0.39	0.28 ± 0.22	0.07 ± 0.19			
	1 lepton	-	_	_	_	_			
$WZ\rightarrow 1\ell 3\nu$, amenlo pythia8	1 lepton, from W	_	_	_	_	_			
=, umonio pjunuo	1 lepton, from t	_	_	_	_	_			
	≥ 2 leptons	0.72 0.46	1 70 1 0 55						
	$Z \rightarrow \nu \nu$	0.73 ± 0.46	1.78 ± 0.55	0.48 ± 0.39	0.28 ± 0.22	0.07 ± 0.19			
	Inclusve 1 lepton	0.06 ± 0.02	0.03 ± 0.01	0.02 ± 0.01	0.01 ± 0.00	0.01 ± 0.01			
	1 lepton, from W								
ZZ	1 lepton, from t	_	_	_	_				
	> 2 leptons	0.03 ± 0.02	0.01 ± 0.01	_	_	0.01 ± 0.01			
	$Z \rightarrow \nu \nu$	0.03 ± 0.01	0.02 ± 0.01	0.02 ± 0.01	0.01 ± 0.00	0.01 ± 0.00			
	Inclusve	0.03 ± 0.02	0.01 ± 0.01	_		0.01 ± 0.01			
	1 lepton	_	_	_	_	_			
$ZZ\rightarrow 2\ell 2Q$, amenlo pythia8	1 lepton, from W	_	_	_	_	_			
22 · 202Q, amonto py mao	1 lepton, from t			_	_				
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	0.03 ± 0.02	0.01 ± 0.01	_	-	0.01 ± 0.01			
	$Z \rightarrow \nu \nu$ Inclusve	0.04 ± 0.01	$ 0.02 \pm 0.01$	0.02 ± 0.00	0.01 ± 0.00	0.00 ± 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, from W	_	_	_	_				
$ZZ\rightarrow 2\ell 2\nu$, powheg pythia8	1 lepton, from t	_	_	_	_	_			
	≥ 2 leptons	_	_	_	_	_			
	$Z \rightarrow \nu \nu$	0.04 ± 0.01	0.02 ± 0.01	0.02 ± 0.00	0.01 ± 0.00	0.00 ± 0.00			
	Inclusve	-0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	_	0.00 ± 0.00			
	1 lepton	_	_	_	_	_			
$ZZ\rightarrow 2Q2\nu$, amenlo pythia8	1 lepton, from W		_						
	1 lepton, from t > 2 leptons	_	_	_	-	_			
	$Z \rightarrow \nu \nu$	-0.00 + 0.00	0.00 ± 0.00	0.00 ± 0.00		0.00 ± 0.00			
	Inclusve	8.28 ± 0.40	3.21 ± 0.25	1.12 ± 0.10	0.42 ± 0.07	0.27 ± 0.06			
	1 lepton	0.20 ± 0.08	-0.07 ± 0.05	-0.04 ± 0.05	0.02 ± 0.02	0.00 ± 0.00			
(T T/	1 lepton, from W	0.14 ± 0.07	-0.08 ± 0.05	-0.04 ± 0.05	0.02 ± 0.02				
tar t + V	1 lepton, from t	0.06 ± 0.03	0.01 ± 0.00	0.00 ± 0.00	_	0.00 ± 0.00			
	≥ 2 leptons	2.03 ± 0.39	0.64 ± 0.25	0.20 ± 0.08	0.09 ± 0.07	0.13 ± 0.05			
	$Z \rightarrow \nu \nu$	6.04 ± 0.07	2.64 ± 0.04	0.96 ± 0.03	0.31 ± 0.01	0.14 ± 0.01			
	Inclusve	2.15 ± 0.39	0.55 ± 0.25	0.15 ± 0.09	0.10 ± 0.07	0.13 ± 0.05			
	1 lepton	0.18 ± 0.08	-0.08 ± 0.05	-0.04 ± 0.05	0.02 ± 0.02	_			
$tar{t}+W$	1 lepton, from W	0.14 ± 0.07	-0.08 ± 0.05	-0.04 ± 0.05	0.02 ± 0.02	_			
	1 lepton, from t > 2 leptons	0.04 ± 0.03 1.97 ± 0.39	0.63 ± 0.25	0.19 ± 0.08	0.09 ± 0.07	0.13 ± 0.05			
	$Z \rightarrow \nu \nu$	1.97 ± 0.39	0.63 ± 0.25	0.19 ± 0.08	0.09 ± 0.07	U.13 ± U.05			
	Inclusve	1.87 ± 0.38	0.28 ± 0.22	0.15 ± 0.09	0.10 ± 0.07	0.10 ± 0.05			
	1 lepton	0.14 ± 0.07	-0.08 ± 0.05	-0.04 ± 0.05	0.02 ± 0.02				
47 W . 41	1 lepton, from W	0.14 ± 0.07	-0.08 ± 0.05	-0.04 ± 0.05	0.02 ± 0.02	_			
$t\bar{t} + W \rightarrow \ell\nu$, amenlo pythia8	1 lepton, from t	_	_	_	_	_			
	≥ 2 leptons	1.73 ± 0.38	0.36 ± 0.21	0.19 ± 0.08	0.09 ± 0.07	0.10 ± 0.05			
	$Z \rightarrow \nu \nu$	_	_	_					
		Continued on next page							

Table 4 - continued from previous page

Table 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	0.28 ± 0.09	0.27 ± 0.12	_		0.03 ± 0.03
	1 lepton	0.28 ± 0.09 0.04 + 0.03	0.27 ± 0.12	_	_	0.03 ± 0.03
		0.04 ± 0.03	_	_	_	_
$t\bar{t} + W \rightarrow QQ$, amenlo pythia8	1 lepton, from W		_	_	_	_
	1 lepton, from t	0.04 ± 0.03	l 	_	_	
	\geq 2 leptons	0.24 ± 0.09	0.27 ± 0.12	_	_	0.03 ± 0.03
	$Z \rightarrow \nu \nu$	_		_	_	
	Inclusve	6.13 ± 0.07	2.66 ± 0.04	0.97 ± 0.03	0.31 ± 0.01	0.14 ± 0.01
	1 lepton	0.02 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	_	0.00 ± 0.00
$t\bar{t} + Z$	1 lepton, from W	_	<u> </u>	_	_	_
11 T Z	1 lepton, from t	0.02 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	_	0.00 ± 0.00
	≥ 2 leptons	0.06 ± 0.01	0.01 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
	$Z \rightarrow \nu \nu$	6.04 ± 0.07	2.64 ± 0.04	0.96 ± 0.03	0.31 ± 0.01	0.14 ± 0.01
	Inclusve	6.13 ± 0.07	2.66 ± 0.04	0.97 ± 0.03	0.31 ± 0.01	0.14 ± 0.01
	1 lepton	0.02 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	_	0.00 ± 0.00
.= , ,	1 lepton, from W	_	_	_	_	_
$t\bar{t} + Z$, madgraph	1 lepton, from t	0.02 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	_	0.00 ± 0.00
	> 2 leptons	0.06 ± 0.01	0.01 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
	$Z \rightarrow \nu \nu$	6.04 ± 0.07	2.64 ± 0.04	0.96 ± 0.03	0.31 ± 0.01	0.14 ± 0.01
	Inclusve	0.07 ± 0.16	-0.04 ± 0.06	0.02 ± 0.02	-0.05 ± 0.06	0.01 ± 0.01
	1 lepton	-0.02 ± 0.02				
	1 lepton, from W		<u> </u>	_	_	
$t\bar{t} + Z \rightarrow QQ$, amenlo pythia8	1 lepton, from t	-0.02 ± 0.02	_			
	> 2 leptons	0.10 ± 0.16	-0.04 ± 0.06	0.02 ± 0.02	-0.05 ± 0.06	0.01 ± 0.01
	$Z \rightarrow \nu \nu$	0.10 ± 0.10	0.01 ± 0.00	0.02 ± 0.02	0.00 ± 0.00	0.01 ± 0.01
	Inclusve	7.24 ± 0.72	2.53 ± 0.49	1.07 ± 0.28	0.11 ± 0.18	0.16 ± 0.11
	1 lepton	1.24 ± 0.72	2.05 ± 0.49	1.07 ± 0.26	0.11 ± 0.16	0.10 ± 0.11
	1 lepton, from W	_	_	_	_	
$t\bar{t} + Z \rightarrow 2\ell 2\nu$, amcnlo pythia8	1 lepton, from t	_	_			_
					_	_
	≥ 2 leptons	0.31 ± 0.18	0.06 ± 0.10	0.02 ± 0.04	0.11 0.10	0.10 0.11
	$Z \rightarrow \nu \nu$	6.92 ± 0.69	2.47 ± 0.48	1.05 ± 0.28	0.11 ± 0.18	0.16 ± 0.11

CR0b, Nominal Systematic, Yield Table for Input Samples

CR0b, Nominal Systematic, Yield Table for Input Samples						
	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		
Data, single e/μ , MET	Inclusve	371.00 ± 19.26	131.00 ± 11.45	93.00 ± 9.64		
	Inclusve	321.08 ± 17.13	93.59 ± 8.88	41.77 ± 3.73		
	1 lepton	240.53 ± 13.58	67.05 ± 6.44	31.41 ± 3.57		
.,, ., ,	1 lepton, from W	240.12 ± 13.57	66.98 ± 6.44	31.35 ± 3.57		
All Background	1 lepton, from t	0.41 ± 0.34	0.07 ± 0.07	0.06 ± 0.06		
	> 2 leptons	46.70 ± 10.19	14.21 ± 5.98	2.55 ± 0.62		
	$Z \rightarrow \nu \nu$	33.85 ± 2.28	12.33 ± 1.23	7.82 ± 0.88		
	Inclusve	43.56 ± 2.18	4.82 ± 0.69	0.73 ± 0.28		
	1 lepton	0.41 ± 0.34	0.07 ± 0.07	0.06 ± 0.06		
$tar{t}$	1 lepton, from W	_	<u> </u>	_		
	1 lepton, from t	0.41 ± 0.34	0.07 ± 0.07	0.06 ± 0.06		
	≥ 2 leptons	43.15 ± 2.16	4.76 ± 0.69	0.67 ± 0.27		
	$Z \rightarrow \nu \nu$	_	_	_		
	Inclusve	0.33 ± 0.33	_	_		
	1 lepton	0.33 ± 0.33	_	_		
$t\bar{t}$, single lepFromT, madgraph pythia8	1 lepton, from W	_	_	_		
tv, omgre repriomit, maagrapii pjimae	1 lepton, from t	0.33 ± 0.33	_	_		
	≥ 2 leptons	_	_	_		
	$Z \rightarrow \nu \nu$	_				
	Inclusve	0.08 ± 0.08	0.07 ± 0.07	0.06 ± 0.06		
	1 lepton	0.08 ± 0.08	0.07 ± 0.07	0.06 ± 0.06		
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	1 lepton, from W	-	-	-		
	1 lepton, from t	0.08 ± 0.08	0.07 ± 0.07	0.06 ± 0.06		
	≥ 2 leptons	_	_	_		
	$Z \rightarrow \nu \nu$	49.15 9.10	—			
	Inclusve	43.15 ± 2.16	4.76 ± 0.69	0.67 ± 0.27		
	1 lepton	_	_	_		
$t\bar{t}$, diLepton, madgraph pythia8, ext1	1 lepton, from W 1 lepton, from t	_	-	_		
	≥ 2 leptons	43.15 ± 2.16	4.76 ± 0.69	0.67 ± 0.27		
	$Z \rightarrow \nu \nu$	45.15 ± 2.10	4.70 ± 0.09	0.07 ± 0.27		
	Inclusve	3.71 ± 1.87	_	_		
	1 lepton	3.71 ± 1.07	_	_		
	1 lepton, from W	_	_	_		
single t	1 lepton, from t	_	_	_		
	> 2 leptons	3.71 ± 1.87	_	_		
	$Z \rightarrow \nu \nu$		_	_		
	Inclusve	3.71 ± 1.87		_		
	1 lepton	_	_	_		
single $t \ t - W$ -channel	1 lepton, from W	_	_	_		
	1 lepton, from t	l .	_	_		
	≥ 2 leptons	3.71 ± 1.87	_	_		
	$Z \rightarrow \nu \nu$	_	_	_		
	Inclusve	_	_	_		
	1 lepton	_	_	_		
single t , $t - W$ -channel, powheg pythia8	1 lepton, from W 1 lepton, from t					
	> 2 leptons					
	$Z \rightarrow \nu \nu$					
	Inclusve	3.71 ± 1.87	_	_		
	1 lepton	1 5.71 ± 1.07	_	_		
	1 lepton, from W	_	_	_		
single $\bar{t},\ t-W$ -channel, powheg pythia8	1 lepton, from t	_	_	_		
	> 2 leptons	3.71 ± 1.87	_	_		
	$Z \rightarrow \nu \nu$	1 = = = = = = = = = = = = = = = = = = =	_	_		
	Inclusve	_	_	_		
	1 lepton	_	_	_		
il_ 4 4 _ W _bl	1 lepton, from W	_	_	_		
single t non $t - W$ -channel	1 lepton, from t	_	_	_		
	≥ 2 leptons	_	_	_		
	$Z \rightarrow \nu \nu$		<u> </u>	<u> </u>		
			Cor	tinued on next page		

$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$ess \ge 6.4$
single t , s-channel, amcnlo pythia8 $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
single t , s-channel, amcnlo pythia8 $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
single t , s-channel, amcnlo pythia8 $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
single t, s-channel, amenio pythia8	
$Z \rightarrow \nu \nu$ — — —	
	3.46
1 lepton 229.35 \pm 13.38 63.59 \pm 6.33 29.21 \pm	3.46
1 lepton, from W 229.35 \pm 13.38 63.59 \pm 6.33 29.21 \pm	3.46
$V+$ Jets 1 lepton, from t 223.35 \pm 13.36 \pm 03.35 \pm 0.37 \pm 23.21 \pm	
$\geq 2 \text{ leptons}$ -13.70 ± 9.69 5.91 ± 5.91 —	
Z ightarrow u u =	
Inclusve -13.70 ± 9.69 5.91 ± 5.91 —	
1 lepton — — — — —	
$DY+Jets \rightarrow \ell\ell$ 1 lepton, from W —	
1 repton, from t — — — — —	
$\geq \frac{2}{100000000000000000000000000000000000$	
$Z \rightarrow \nu \nu$ — — —	
Inclusve — — —	
1 lepton — — —	
$DY+Jets \rightarrow \ell\ell$, M10to50, amcnlo pythia8 1 lepton, from W	
1 lepton, from t — — — —	
≥ 2 leptons $ -$	
Inclusve 1.13.70 \pm 9.69 5.91 \pm 5.91 $-$ 1 lepton $ -$	
Tiepton — — — — — — — — — — — — — — — — — — —	
$\text{DY+Jets} \rightarrow \ell\ell$, M50, amenlo pythia8 1 lepton, from t	
> 2 leptons -13.70 ± 9.69 5.91 ± 5.91 -	
$Z \rightarrow \nu \nu$ $ -$	
Incluse 229.35 \pm 13.38 63.59 \pm 6.33 29.21 \pm	3.46
1 lepton 229.35 \pm 13.38 63.59 \pm 6.33 29.21 \pm	
1 lepton from W 220 25 ± 12 28 62 50 ± 6.22 20 21 ±	
W+Jets $\rightarrow \ell \nu$ 1 lepton, from t 223.35 1 3.36 03.35 1 0.35 25.21 \pm	
≥ 2 leptons — — — —	
Z ightarrow u u u u u u u u u u u u u	
Inclusve 62.02 ± 8.96 11.78 ± 3.76 3.78 ± 1	
1 lepton 62.02 \pm 8.96 11.78 \pm 3.76 3.78 \pm 1	
W+Jets $\rightarrow \ell \nu$, 100 $<$ $HT <$ 200, madgraph pythia8 1 lepton, from W 62.02 \pm 8.96 11.78 \pm 3.76 3.78 \pm 1	1.89
1 lepton, from t — — — —	
≥ 2 leptons — — — —	
Z ightarrow u u u u u u u u u u u u u	
Incluse 139.55 ± 9.19 29.95 ± 3.97 8.08 ± 1	
1 lepton 139.55 \pm 9.19 29.95 \pm 3.97 8.08 \pm 1	
W+Jets $\rightarrow \ell \nu$, 200 $<$ HT $<$ 400, madgraph pythia8 1 lepton, from W 139.55 \pm 9.19 29.95 \pm 3.97 8.08 \pm 1	1.91
1 lepton, from t — — — —	
$egin{array}{c ccccc} \geq 2 & \mathrm{leptons} & - & - & - & - & - & - & - & - & - & $	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	2.00
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
1 lepton from W 21 43 + 3.75 17.79 + 3.15 9.08 + 3	
W+Jets $\rightarrow \ell \nu$, 400 $<$ HT $<$ 600, madgraph pythia8 1 lepton, from t 1 lepton, from t - - -	2.00
> 2 leptons — — —	
$Z \rightarrow \nu \nu$ — — — —	
Incluse 4.52 ± 0.61 3.08 ± 0.47 5.63 ± 0.61	0.58
1 lepton 4.52 ± 0.61 3.08 ± 0.47 5.63 ± 0	
1 lepton from W 4.52 ± 0.61 3.08 ± 0.47 5.63 ± 0.61	
1 lepton, from t	
≥ 2 leptons — — — —	

Table 5 – continued from previous page

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	1.52 ± 0.18	0.76 ± 0.12	2.26 ± 0.19			
	1 lepton	1.52 ± 0.18	0.76 ± 0.12	2.26 ± 0.19			
W+Jets $\rightarrow \ell \nu$, 800 $< HT < 1200$, madgraph pythia8	1 lepton, from W	1.52 ± 0.18	0.76 ± 0.12	2.26 ± 0.19			
$W+Jets \rightarrow \ell \nu$, 800 $< HI < 1200$, maggraph pythias	1 lepton, from t	_	_	_			
	≥ 2 leptons	_	_	_			
	$Z \rightarrow \nu \nu$	_	_	_			
	Inclusve	0.24 ± 0.17	0.20 ± 0.14	0.35 ± 0.18			
	1 lepton	0.24 ± 0.17	0.20 ± 0.14	0.35 ± 0.18			
W+Jets $\rightarrow \ell \nu$, 1200 < HT < 2500, madgraph pythia8	1 lepton, from W	0.24 ± 0.17	0.20 ± 0.14	0.35 ± 0.18			
	1 lepton, from t	_	_	_			
	≥ 2 leptons	_	_	_			
	$Z \rightarrow \nu \nu$						
	Inclusve	0.07 ± 0.01	0.02 ± 0.01	0.02 ± 0.01			
	1 lepton	0.07 ± 0.01	0.02 ± 0.01	0.02 ± 0.01			
W+Jets $\rightarrow \ell \nu$, 2500 $< HT < Inf$, madgraph pythia8	1 lepton, from W	0.07 ± 0.01	0.02 ± 0.01	0.02 ± 0.01			
, , , , , , , , , , , , , , , , , , , ,	1 lepton, from t	_	_	_			
	≥ 2 leptons	_	_	_			
	$Z \rightarrow \nu \nu$	E9 17 ± 9 47	10.27 ± 1.84	11 99 ± 1 92			
	Inclusve 1 lepton	58.17 ± 3.47 10.77 ± 2.25	19.27 ± 1.84 3.40 ± 1.20	11.83 ± 1.36 2.14 ± 0.86			
	1 lepton 1 lepton, from W	10.77 ± 2.25 10.77 ± 2.25	3.40 ± 1.20 3.40 ± 1.20	2.14 ± 0.86 2.14 ± 0.86			
Rare	1 lepton, from w	10.77 ± 2.23	3.40 ± 1.20	2.14 ± 0.80			
	> 2 leptons	13.55 ± 1.33	3.54 ± 0.64	1.87 ± 0.56			
	$Z \rightarrow \nu \nu$	33.85 ± 2.28	12.33 ± 1.23	7.82 ± 0.88			
	Inclusve	56.71 ± 3.47	18.92 ± 1.84	11.63 ± 1.36			
	1 lepton	10.77 ± 2.25	3.37 ± 1.20	2.11 ± 0.86			
	1 lepton, from W	10.77 ± 2.25	3.37 ± 1.20	2.11 ± 0.86			
diBoson	1 lepton, from t			I =			
	> 2 leptons	13.22 ± 1.33	3.54 ± 0.64	1.85 ± 0.56			
	$Z \rightarrow \nu \nu$	32.71 ± 2.28	12.01 ± 1.23	7.66 ± 0.88			
	Inclusve	21.56 ± 2.59	6.16 ± 1.35	3.52 ± 1.02			
	1 lepton	8.94 ± 2.24	2.93 ± 1.19	1.71 ± 0.86			
WW	1 lepton, from W	8.94 ± 2.24	2.93 ± 1.19	1.71 ± 0.86			
W W	1 lepton, from t	_	_	_			
	≥ 2 leptons	12.62 ± 1.31	3.24 ± 0.63	1.80 ± 0.56			
	$Z \rightarrow \nu \nu$	_	_	_			
	Inclusve	12.62 ± 1.31	3.24 ± 0.63	1.80 ± 0.56			
	1 lepton	_	<u> </u>	_			
$WW \rightarrow 2\ell 2\nu$, powheg	1 lepton, from W	_	_	_			
2021, powneg	1 lepton, from t	<u> </u>	l -	<u> </u>			
	≥ 2 leptons	12.62 ± 1.31	3.24 ± 0.63	1.80 ± 0.56			
	$Z \rightarrow \nu \nu$	<u> </u>	<u> </u>	<u> </u>			
	Inclusve	8.94 ± 2.24	2.93 ± 1.19	1.71 ± 0.86			
	1 lepton	8.94 ± 2.24	2.93 ± 1.19	1.71 ± 0.86			
$WW \rightarrow \ell \nu qq$, powheg	1 lepton, from W	8.94 ± 2.24	2.93 ± 1.19	1.71 ± 0.86			
*** I · · · · · · · · · · · · · · · · ·	1 lepton, from t	_	_	_			
	≥ 2 leptons	_	_	_			
	$Z \rightarrow \nu \nu$						
	Inclusve	33.87 ± 2.31	12.41 ± 1.25	7.91 ± 0.89			
	1 lepton	1.83 ± 0.27	0.44 ± 0.13	0.40 ± 0.10			
WZ	1 lepton, from W	1.83 ± 0.27	0.44 ± 0.13	0.40 ± 0.10			
	1 lepton, from t	0.56 ± 0.17	0.30 ± 0.12	0.05 ± 0.04			
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	0.56 ± 0.17 31.48 ± 2.28	0.30 ± 0.12 11.66 ± 1.23	7.47 ± 0.88			
	$Z \rightarrow \nu\nu$ Inclusve	0.51 ± 0.16	0.29 ± 0.12	0.04 ± 0.04			
	1 lepton	0.51 ± 0.10	0.29 ± 0.12	0.04 ± 0.04			
	1 lepton, from W						
$WZ \rightarrow 3\ell\nu$, powheg pythia8	1 lepton, from t	_	_	_			
	> 2 leptons	0.51 ± 0.16	0.29 ± 0.12	0.04 ± 0.04			
	$Z \rightarrow \nu \nu$			I			
		1	Cor	ntinued on next page			
				page			

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 ± 0.04	0.01 ± 0.01	0.01 ± 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 ± 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 ± 0.13	0.40 ± 0.10				
	1 lepton	1.83 ± 0.27 1.83 ± 0.27	0.44 ± 0.13	0.40 ± 0.10 0.40 ± 0.10				
	1 lepton, from W	1.83 ± 0.27	0.44 ± 0.13	0.40 ± 0.10				
$WZ \rightarrow \ell \nu 2Q$, amenlo pythia8	1 lepton, from t			' = ' '				
	≥ 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$	_	_	_				
	Inclusve	31.48 ± 2.28	11.66 ± 1.23	7.47 ± 0.88				
	1 lepton	_	_	_				
$WZ \rightarrow 1\ell 3\nu$, amenlo pythia8	1 lepton, from W	_	_	_				
	1 lepton, from t	_	-	_				
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	31.48 ± 2.28	11.66 ± 1.23	$-$ 7.47 \pm 0.88				
	Inclusve	1.27 ± 0.07	0.35 ± 0.03	0.20 ± 0.02				
	1 lepton	1		- 0.02				
7.7	1 lepton, from W	_	_	_				
ZZ	1 lepton, from t	_	_	_				
	≥ 2 leptons	0.04 ± 0.04	0.00 ± 0.01	_				
	$Z \rightarrow \nu \nu$	1.23 ± 0.05	0.35 ± 0.03	0.20 ± 0.02				
	Inclusve	0.04 ± 0.04	0.00 ± 0.01	_				
	1 lepton		_	_				
$ZZ \rightarrow 2\ell 2Q$, amenlo pythia8	1 lepton, from W	_	-	_				
	1 lepton, from t > 2 leptons	0.04 ± 0.04	0.00 ± 0.01	-				
	$Z \rightarrow \nu \nu$	0.04 ± 0.04	0.00 ± 0.01					
	Inclusve	1.18 ± 0.04	0.34 ± 0.02	0.19 ± 0.01				
	1 lepton	<u> </u>	_	_				
$ZZ\rightarrow 2\ell 2\nu$, powheg pythia8	1 lepton, from W	_	_	_				
22 - 2020, powneg pythiao	1 lepton, from t	_	_	_				
	≥ 2 leptons							
	$Z \rightarrow \nu \nu$	1.18 ± 0.04	0.34 ± 0.02	0.19 ± 0.01				
	Inclusve 1 lepton	0.05 ± 0.03	0.01 ± 0.02	0.01 ± 0.01				
	1 lepton, from W	_	_	_				
$ZZ \rightarrow 2Q2\nu$, amenlo pythia8	1 lepton, from t	_	_	_				
	> 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$	0.05 ± 0.03	0.01 ± 0.02	0.01 ± 0.01				
	Inclusve	1.47 ± 0.14	0.34 ± 0.05	0.20 ± 0.03				
	1 lepton	_	0.03 ± 0.03	0.02 ± 0.02				
$t\bar{t} + V$	1 lepton, from W	_	0.03 ± 0.03	0.02 ± 0.02				
	1 lepton, from t	0.33 ± 0.13	0.01 ± 0.04	0.02 ± 0.02				
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	0.33 ± 0.13 1.14 ± 0.03	0.01 ± 0.04 0.31 ± 0.02	0.02 ± 0.02 0.16 ± 0.01				
	Inclusve	0.32 ± 0.13	0.31 ± 0.02 0.03 ± 0.05	0.16 ± 0.01 0.04 ± 0.03				
	1 lepton	0.02 ± 0.10	0.03 ± 0.03	0.04 ± 0.03 0.02 ± 0.02				
47 W	1 lepton, from W	_	0.03 ± 0.03	0.02 ± 0.02				
$tar{t}+W$	1 lepton, from t	_	_	_				
	\geq 2 leptons	0.32 ± 0.13	0.01 ± 0.04	0.02 ± 0.02				
	$Z \rightarrow \nu \nu$	_	_					
	Inclusve	0.26 ± 0.13	0.06 ± 0.04	0.02 ± 0.02				
	1 lepton	_	0.03 ± 0.03	$\begin{array}{c} 0.02 \pm 0.02 \\ 0.02 \pm 0.02 \end{array}$				
$t\bar{t} + W \rightarrow \ell\nu$, amenlo pythia8	1 lepton, from W 1 lepton, from t		0.03 ± 0.03	0.02 ± 0.02				
	≥ 2 leptons	0.26 ± 0.13	0.03 ± 0.03	_				
	$Z \rightarrow \nu \nu$	1		_				
	+	1	Con	ntinued on next page				

Table 5 - continued from previous page

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	0.06 ± 0.04	-0.03 ± 0.03	0.02 ± 0.02				
	1 lepton	0.00 ± 0.01	- 0.00 ± 0.00	0.02 ± 0.02				
	1 lepton, from W	_	_	_				
$t\bar{t} + W \rightarrow QQ$, amcnlo pythia8	1 lepton, from t	_	_	_				
	> 2 leptons	0.06 ± 0.04	-0.03 ± 0.03	0.02 ± 0.02				
	$Z \rightarrow \nu \nu$	0.00 ± 0.01		0.02 ± 0.02				
	Inclusve	1.14 ± 0.03	0.31 ± 0.02	0.16 ± 0.01				
	1 lepton	1.14 ± 0.03	0.51 ± 0.02	0.10 ± 0.01				
	1 lepton, from W	_	_	_				
$t\bar{t} + Z$	1 lepton, from t	_	_	_				
	> 2 leptons	0.01 + 0.00	_	0.00 ± 0.00				
	$Z \rightarrow \nu \nu$	1.14 ± 0.03	0.31 ± 0.02	0.00 ± 0.00 0.16 ± 0.01				
	Inclusve	1.14 ± 0.03	0.31 ± 0.02 0.31 ± 0.02	0.16 ± 0.01 0.16 ± 0.01				
		1.14 ± 0.03	0.31 ± 0.02	0.16 ± 0.01				
	1 lepton 1 lepton, from W	_	_	_				
$t\bar{t} + Z$, madgraph	1 lepton, from t	_	_	_				
		0.01 ± 0.00	_	0.00 ± 0.00				
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	1.14 ± 0.03	0.31 ± 0.02	0.00 ± 0.00 0.16 ± 0.01				
	$Z \rightarrow \nu\nu$ Inclusve			0.16 ± 0.01				
		0.05 ± 0.05	0.03 ± 0.03	_				
	1 lepton	_	_	_				
$t\bar{t} + Z \rightarrow QQ$, amenlo pythia8	1 lepton, from W	_	_	_				
	1 lepton, from t			_				
	≥ 2 leptons	0.05 ± 0.05	0.03 ± 0.03	_				
	$Z \rightarrow \nu \nu$	_	<u> </u>					
	Inclusve	1.07 ± 0.25	0.32 ± 0.12	0.25 ± 0.09				
	1 lepton	_	_	_				
$t\bar{t} + Z \rightarrow 2\ell 2\nu$, amenlo pythia8	1 lepton, from W	_	_	_				
FJ	1 lepton, from t		_	_				
	≥ 2 leptons	0.06 ± 0.04	-	<u> </u>				
	$Z \rightarrow \nu \nu$	1.01 ± 0.25	0.32 ± 0.12	0.25 ± 0.09				

CR0b, Nominal Systematic, Yield Table for Input Samples

CR0b, Nominal Systematic, Yield Table for Input Samples						
Sample	Classification	3jets MT2W>200	3jets MT2W>200	3jets MT2W>200	3jets MT2W>200	
Sample	Classification	250 < MET < 350	350 < MET < 450	$M12W \ge 200$ 450 < MET < 550	MET > 550	
Data, single e/μ , MET	Inclusve	164.00 ± 12.81	48.00 ± 6.93	17.00 ± 4.12	25.00 ± 5.00	
	Inclusve	148.16 ± 7.88	55.95 ± 4.59	14.60 ± 2.14	13.11 ± 1.73	
	1 lepton	94.07 ± 7.35	40.07 ± 4.41	11.72 ± 2.05	9.79 ± 1.66	
411 D 1	1 lepton, from W	93.41 ± 7.34	40.07 ± 4.41	11.72 ± 2.05	9.52 ± 1.65	
All Background	1 lepton, from t	0.66 ± 0.36	0.00 ± 0.00	0.00 ± 0.00	0.27 ± 0.21	
	> 2 leptons	35.97 ± 2.42	8.11 ± 0.91	1.07 ± 0.30	0.88 ± 0.25	
	$Z \rightarrow \nu \nu$	18.13 ± 1.51	7.77 ± 0.89	1.81 ± 0.55	2.44 ± 0.42	
	Inclusve	27.65 ± 1.94	5.65 ± 0.73	0.63 ± 0.21	0.71 ± 0.27	
	1 lepton	0.65 ± 0.36			0.27 ± 0.21	
.=	1 lepton, from W	<u> </u>	_	_		
$tar{t}$	1 lepton, from t	0.65 ± 0.36	_	_	0.27 ± 0.21	
	> 2 leptons	26.99 ± 1.90	5.65 ± 0.73	0.63 ± 0.21	0.44 ± 0.17	
	$Z \rightarrow \nu \nu$					
	Inclusve	0.32 ± 0.32	_		0.20 ± 0.20	
	1 lepton	0.32 ± 0.32	_	_	0.20 ± 0.20	
	1 lepton, from W	0.02 ± 0.02	_	_		
$t\bar{t}$, single lepFromT, madgraph pythia8	1 lepton, from t	0.32 ± 0.32	_	_	0.20 ± 0.20	
	> 2 leptons	- 0.52	_	_	J.20 ± 0.20	
	$Z \rightarrow \nu \nu$	_	_	_	_	
	Inclusve	0.33 ± 0.16	_		0.07 ± 0.07	
	1 lepton	0.33 ± 0.16 0.33 ± 0.16		_	0.07 ± 0.07	
	1 lepton from W	0.33 ± 0.10			0.07 ± 0.07	
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	1 lepton, from t	0.33 ± 0.16	_	_	0.07 ± 0.07	
	> 2 leptons	0.33 ± 0.10	_	_	0.07 ± 0.07	
	$Z \rightarrow \nu \nu$					
	Inclusve	26.99 ± 1.90	5.65 ± 0.73	0.63 ± 0.21	0.44 ± 0.17	
	1 lepton	20.99 ± 1.90	3.03 ± 0.73	0.03 ± 0.21	0.44 1 0.17	
	1 lepton, from W			_	_	
$t\bar{t}$, diLepton, madgraph pythia8, ext1	1 lepton, from t		_	_	_	
	> 2 leptons	26.99 ± 1.90	5.65 ± 0.73	0.63 ± 0.21	0.44 ± 0.17	
	$Z \rightarrow \nu \nu$	20.99 ± 1.90	3.03 ± 0.73	0.03 ± 0.21	0.44 1 0.17	
	Inclusve	1.08 ± 1.08			_	
	1 lepton	1.08 ± 1.08	_	_	_	
	1 lepton from W		_	_		
single t	1 lepton, from t			_	_	
	> 2 leptons	1.08 ± 1.08		_	_	
	$Z \rightarrow \nu \nu$	1.00 ± 1.00		_	_	
	Inclusve	1.08 ± 1.08	_		_	
	1 lepton	1.00 ± 1.00		_	_	
	1 lepton, from W			_	_	
single $t t - W$ -channel	1 lepton, from t			_	_	
	≥ 2 leptons	1.08 ± 1.08		_	_	
	$Z \rightarrow \nu \nu$	1.08 ± 1.08				
	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	1.08 ± 1.08			_	
	1 lepton	1.00 ± 1.00				
	1 lepton from W					
single \bar{t} , $t - W$ -channel, powheg pythia8	1 lepton, from w 1 lepton, from t	_	_	_	_	
single $\bar{t},\ t-W$ -channel, powheg pythia8	1 repron. from t	-	_	_	_	
single $\bar{t},\ t-W$ -channel, powheg pythia8						
single $\bar{t},\ t-W$ -channel, powheg pythia8	\geq 2 leptons	1.08 ± 1.08	_	_		
single $\bar{t},\ t-W$ -channel, powheg pythia 8	$\geq 2 \text{ leptons} \ Z o u u$	1.08 ± 1.08 —	_		_	
single $\bar{t},\ t-W$ -channel, powheg pythia8	$\geq 2 ext{ leptons} \ Z o u u$ Inclusve	1.08 ± 1.08 —	_ _ _			
single $\bar{t},\ t-W$ -channel, powheg pythia 8	$\geq 2 ext{ leptons} \ Z o u u$ Inclusve 1 lepton	1.08 ± 1.08 ————————————————————————————————————	<u> </u>	<u> </u>		
single $ar{t},\ t-W$ -channel, powheg pythia 8 $\label{eq:total_single} \text{single } t \text{ non } t-W\text{-channel}$	$\geq 2 ext{ leptons}$ $Z o u $ Inclusve 1 lepton 1 lepton, from W	1.08 ± 1.08 ————————————————————————————————————		<u> </u>		
		1.08 ± 1.08 ————————————————————————————————————		<u>=</u> 		
	$\geq 2 ext{ leptons}$ $Z o u $ Inclusve 1 lepton 1 lepton, from W	1.08 ± 1.08		<u></u>		

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 ± 7.24	35.39 ± 4.15	11.02 ± 1.98	8.63 ± 1.56
	1 lepton	89.66 ± 7.24	35.39 ± 4.15	11.02 ± 1.98	8.63 ± 1.56
	1 lepton, from W	89.66 ± 7.24	35.39 ± 4.15	11.02 ± 1.98	8.63 ± 1.56
$V+{ m Jets}$	1 lepton, from t				
	> 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	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 44 3470 1 111.0	1 lepton, from W	_	_	<u> </u>	_
$DY+Jets \rightarrow \ell\ell$, M50, amcnlo pythia8	1 lepton, from t	_	_	<u> </u>	_
	> 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	89.66 ± 7.24	35.39 ± 4.15	11.02 ± 1.98	8.63 ± 1.56
	1 lepton	89.66 ± 7.24	35.39 ± 4.15	11.02 ± 1.98	8.63 ± 1.56
****	1 lepton, from W	89.66 ± 7.24	35.39 ± 4.15	11.02 ± 1.98	8.63 ± 1.56
W+Jets $\rightarrow \ell \nu$	1 lepton, from t	_	_	_	_
	> 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	6.76 ± 3.02	2.22 ± 1.57	1.02 ± 1.02	1.60 ± 1.13
	1 lepton	6.76 ± 3.02	2.22 ± 1.57	1.02 ± 1.02	1.60 ± 1.13
W+Jets $\rightarrow \ell \nu$, 100 < HT < 200, madgraph pythia8	1 lepton, from W	6.76 ± 3.02	2.22 ± 1.57	1.02 ± 1.02	1.60 ± 1.13
$W+Jets \rightarrow \ell \nu$, $100 < HI < 200$, madgraph pytmas	1 lepton, from t	_	_	_	_
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	40.36 ± 5.01	8.45 ± 2.11	2.33 ± 1.04	0.77 ± 0.54
	1 lepton	40.36 ± 5.01	8.45 ± 2.11	2.33 ± 1.04	0.77 ± 0.54
W+Jets $\rightarrow \ell \nu$, 200 < HT < 400, madgraph pythia8	1 lepton, from W	40.36 ± 5.01	8.45 ± 2.11	2.33 ± 1.04	0.77 ± 0.54
** + 5005 - 60, 200 \ 111 \ 400, maugraph pythias	1 lepton, from t	_	_	_	_
	≥ 2 leptons	_	-	<u> </u>	_
	Z ightarrow u u			<u> </u>	
	Inclusve	25.77 ± 4.13	16.45 ± 3.13	3.02 ± 1.23	1.62 ± 0.81
	1 lepton	25.77 ± 4.13	16.45 ± 3.13	3.02 ± 1.23	1.62 ± 0.81
W+Jets $\rightarrow \ell \nu$, 400 < HT < 600, madgraph pythia8	1 lepton, from W	25.77 ± 4.13	16.45 ± 3.13	3.02 ± 1.23	1.62 ± 0.81
** + 5005 - 60, 400 \ 111 \ 000, maugraph pythias	1 lepton, from t	_	_	_	_
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	<u> </u>		<u> </u>	
	Inclusve	9.50 ± 0.90	5.32 ± 0.62	2.43 ± 0.40	1.69 ± 0.30
	1 lepton	9.50 ± 0.90	5.32 ± 0.62	2.43 ± 0.40	1.69 ± 0.30
W+Jets $\rightarrow \ell \nu$, 600 < HT < 800, madgraph pythia8	1 lepton, from W	9.50 ± 0.90	5.32 ± 0.62	2.43 ± 0.40	1.69 ± 0.30
** + 5005 - 60, 000 \ 111 \ 000, maugraph pythias	1 lepton, from t	_	-	<u> </u>	_
	≥ 2 leptons	_	-	_	-
	$Z \rightarrow \nu \nu$			<u> </u>	
				Continue	d on next page

Table 6 - continued from previous page

	Table 6 – contir	nued 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	4.89 ± 0.33	2.26 ± 0.21	1.51 ± 0.16	2.06 ± 0.17
	1 lepton	4.89 ± 0.33	2.26 ± 0.21	1.51 ± 0.16	2.06 ± 0.17
	1 lepton, from W	4.89 ± 0.33	2.26 ± 0.21	1.51 ± 0.16	2.06 ± 0.17
W+Jets $\rightarrow \ell \nu$, 800 $< HT < 1200$, madgraph pythia8	1 lepton, from t	4.05 ± 0.55	2.20 ± 0.21	1.01 ± 0.10	2.00 ± 0.11
	> 2 leptons		_		
	$Z \rightarrow \nu \nu$		_	_	_
	Inclusve	2.27 ± 0.54	0.63 ± 0.26	0.68 ± 0.26	0.85 ± 0.26
	1 lepton	2.27 ± 0.54	0.63 ± 0.26	0.68 ± 0.26	0.85 ± 0.26
W+Jets $\rightarrow \ell \nu$, 1200 < HT < 2500, madgraph pythia8	1 lepton, from W	2.27 ± 0.54	0.63 ± 0.26	0.68 ± 0.26	0.85 ± 0.26
, , , , , , , , , , , , , , , , , , , ,	1 lepton, from t	-	_	_	_
	≥ 2 leptons		_	_	_
	$Z \rightarrow \nu \nu$	-	_	<u> </u>	_
	Inclusve	0.12 ± 0.02	0.05 ± 0.01	0.03 ± 0.01	0.03 ± 0.01
	1 lepton	0.12 ± 0.02	0.05 ± 0.01	0.03 ± 0.01	0.03 ± 0.01
W+Jets $\rightarrow \ell \nu$, 2500 < HT < Inf , madgraph pythia8	1 lepton, from W	0.12 ± 0.02	0.05 ± 0.01	0.03 ± 0.01	0.03 ± 0.01
, vece . ev, 2000 \ 111 \ 1mj, madgraph pythiae	1 lepton, from t	_	_	_	_
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$				<u> </u>
<u> </u>	Inclusve	29.77 ± 2.17	14.90 ± 1.81	2.95 ± 0.80	3.77 ± 0.70
	1 lepton	3.75 ± 1.16	4.68 ± 1.48	0.70 ± 0.54	0.89 ± 0.54
Rare	1 lepton, from W	3.75 ± 1.16	4.68 ± 1.48	0.70 ± 0.54	0.89 ± 0.54
Rare	1 lepton, from t	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	_
	> 2 leptons	7.89 ± 1.03	2.46 ± 0.54	0.44 ± 0.21	0.44 ± 0.18
	$Z \rightarrow \nu \nu$	18.13 ± 1.51	7.77 ± 0.89	1.81 ± 0.55	2.44 ± 0.42
	Inclusve	27.69 ± 2.16	14.36 ± 1.81	2.74 ± 0.80	3.68 ± 0.70
	1 lepton	3.75 ± 1.16	4.68 ± 1.48	0.70 ± 0.54	0.89 ± 0.54
	1 lepton, from W	3.75 ± 1.16	4.68 ± 1.48	0.70 ± 0.54	0.89 ± 0.54
diBoson	1 lepton, from t				
	> 2 leptons	7.38 ± 1.01	2.42 ± 0.53	0.40 ± 0.21	0.44 ± 0.18
	$Z \rightarrow \nu \nu$	16.56 ± 1.51	7.26 ± 0.89	1.64 ± 0.55	2.35 ± 0.42
	Inclusve	9.20 ± 1.51	6.55 ± 1.57	0.95 ± 0.57	1.10 ± 0.56
	1 lepton	2.27 ± 1.14	4.17 ± 1.48	0.54 ± 0.54	0.75 ± 0.53
	1 lepton, from W	2.27 ± 1.14 2.27 ± 1.14	4.17 ± 1.48	0.54 ± 0.54 0.54 ± 0.54	0.75 ± 0.53
WW	1 lepton, from t		4.17 ± 1.40	0.04 ± 0.04	0.70 ± 0.00
	> 2 leptons	6.93 ± 1.00	2.38 ± 0.53	0.41 ± 0.21	0.35 ± 0.17
	$Z \rightarrow \nu \nu$	0.93 ± 1.00	2.38 ± 0.33	0.41 ± 0.21	0.33 ± 0.17
	Inclusve	6.93 ± 1.00	2.38 ± 0.53	0.41 ± 0.21	0.35 ± 0.17
	1 lepton	0.93 ± 1.00	2.38 ± 0.33	0.41 ± 0.21	0.35 ± 0.17
		-	_	_	_
$WW \rightarrow 2\ell 2\nu$, powheg	1 lepton, from W		_	_	_
	1 lepton, from t	6.03 ± 1.00	2 28 + 0 52	0.41 ± 0.21	0.25 ± 0.17
	≥ 2 leptons	6.93 ± 1.00	2.38 ± 0.53	0.41 ± 0.21	0.35 ± 0.17
	$Z \rightarrow \nu \nu$		4 17 1 1 40	-	0.55 0.50
	Inclusve	2.27 ± 1.14	4.17 ± 1.48	0.54 ± 0.54	0.75 ± 0.53
	1 lepton	2.27 ± 1.14	4.17 ± 1.48	0.54 ± 0.54	0.75 ± 0.53
$WW \rightarrow \ell \nu qq$, powheg	1 lepton, from W	2.27 ± 1.14	4.17 ± 1.48	0.54 ± 0.54	0.75 ± 0.53
A A / I · · · · · · · · · · · · · · · · · ·	1 lepton, from t	_	_	_	_
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	<u> </u>	_	_	_
	Inclusve	17.99 ± 1.54	7.62 ± 0.90	1.70 ± 0.55	2.53 ± 0.43
	1 lepton	1.48 ± 0.26	0.51 ± 0.15	0.16 ± 0.08	0.14 ± 0.06
WZ	1 lepton, from W	1.48 ± 0.26	0.51 ± 0.15	0.16 ± 0.08	0.14 ± 0.06
** #	1 lepton, from t	_	-	_	-
	\geq 2 leptons	0.43 ± 0.15	0.04 ± 0.05	-0.01 ± 0.01	0.10 ± 0.06
	$Z \rightarrow \nu \nu$	16.09 ± 1.51	7.07 ± 0.89	1.55 ± 0.55	2.29 ± 0.42
		0.38 ± 0.15	0.04 ± 0.04	_	0.10 ± 0.06
	Inclusve	0.38 ± 0.13			
	Inclusve 1 lepton	U.38 ± U.13		_	_
W.7 264 powbog puthing		0.38 ± 0.13 —		 	_
$WZ \rightarrow 3\ell\nu$, powheg pythia8	1 lepton				_ _ _
$WZ { ightarrow} 3\ell \nu,$ powheg pythia8	1 lepton $1 lepton, from W$	0.38 ± 0.15 — — — 0.38 ± 0.15	0.04 ± 0.04	 	0.10 ± 0.06
$WZ\! ightarrow \! 3\ell u,$ powheg pythia 8	1 lepton 1 lepton, from W 1 lepton, from t	_ _ _	_ _ _		0.10 ± 0.06

Table 6 - continued from previous page

	Table 6 – conti	nued from previous pa			
		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	0.04 ± 0.04	-0.00 ± 0.02	-0.01 ± 0.01	_
	1 lepton				_
	1 lepton, from W	_	_		_
$WZ\rightarrow 2\ell 2Q$, amcnlo pythia8	1 lepton, from t	_	_	_	_
	> 2 leptons	0.04 ± 0.04	-0.00 ± 0.02	-0.01 ± 0.01	_
	$Z \rightarrow \nu \nu$				_
	Inclusve	1.48 ± 0.26	0.51 ± 0.15	0.16 ± 0.08	0.14 ± 0.06
	1 lepton	1.48 ± 0.26	0.51 ± 0.15	0.16 ± 0.08	0.14 ± 0.06
	1 lepton, from W	1.48 ± 0.26	0.51 ± 0.15	0.16 ± 0.08	0.14 ± 0.06
$WZ \rightarrow \ell \nu 2Q$, amcnlo pythia8	1 lepton, from t				
	> 2 leptons	_	_	i — '	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	16.09 ± 1.51	7.07 ± 0.89	1.55 ± 0.55	2.29 ± 0.42
	1 lepton			i	
	1 lepton, from W	_	_		_
$WZ \rightarrow 1\ell 3\nu$, amenlo pythia8	1 lepton, from t	_	_	ı — '	_
	> 2 leptons	_	_	ı — ¹	_
	$Z \rightarrow \nu \nu$	16.09 ± 1.51	7.07 ± 0.89	1.55 ± 0.55	2.29 ± 0.42
	Inclusve	0.50 ± 0.04	0.19 ± 0.02	0.09 ± 0.01	0.05 ± 0.01
	1 lepton		I	ı	
77	1 lepton, from W	_	_	i —	_
ZZ	1 lepton, from t	_	_	ı — ¹	_
	> 2 leptons	0.03 ± 0.02	0.00 ± 0.01	-0.01 ± 0.01	_
	$Z \rightarrow \nu \nu$	0.47 ± 0.03	0.19 ± 0.02	0.10 ± 0.01	0.05 ± 0.01
	Inclusve	0.03 ± 0.02	0.00 ± 0.01	-0.01 ± 0.01	
	1 lepton				_
	1 lepton, from W	_	_	_	_
$ZZ\rightarrow 2\ell 2Q$, amcnlo pythia8	1 lepton, from t	_	_	_	_
	> 2 leptons	0.03 ± 0.02	0.00 ± 0.01	-0.01 ± 0.01	_
	$Z \rightarrow \nu \nu$				_
	Inclusve	0.44 ± 0.03	0.17 ± 0.01	0.08 ± 0.01	0.05 ± 0.01
	1 lepton				
77 040 1 1110	1 lepton, from W	_	_		_
$ZZ \rightarrow 2\ell 2\nu$, powheg pythia8	1 lepton, from t	_	_		_
	> 2 leptons	_	_	i — '	_
	$Z \rightarrow \nu \nu$	0.44 ± 0.03	0.17 ± 0.01	0.08 ± 0.01	0.05 ± 0.01
	Inclusve	0.03 ± 0.02	0.01 ± 0.01	0.02 ± 0.01	_
	1 lepton	_	_		_
77 . 20211	1 lepton, from W	_	_	i —	_
$ZZ\rightarrow 2Q2\nu$, amcnlo pythia8	1 lepton, from t	_	_	i —	_
	≥ 2 leptons	_	_	i —	_
	$Z \rightarrow \nu \nu$	0.03 ± 0.02	0.01 ± 0.01	0.02 ± 0.01	_
	Inclusve	2.08 ± 0.18	0.55 ± 0.07	0.21 ± 0.06	0.09 ± 0.01
	1 lepton	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	_
$t\bar{t}+V$	1 lepton, from W	_	_	ı — İ	_
ιι ⊤ ν	1 lepton, from t	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	_
	≥ 2 leptons	0.51 ± 0.17	0.03 ± 0.07	0.05 ± 0.05	_
	$Z \rightarrow \nu \nu$	1.57 ± 0.04	0.51 ± 0.02	0.16 ± 0.01	0.09 ± 0.01
	Inclusve	0.49 ± 0.17	0.03 ± 0.07	0.04 ± 0.05	
	1 lepton	_	_	ı — İ	_
$t\bar{t}+W$	1 lepton, from W	_	_	_	_
00 T **	1 lepton, from t	_	_	. –	_
	\geq 2 leptons	0.49 ± 0.17	0.03 ± 0.07	0.04 ± 0.05	_
	$Z \rightarrow \nu \nu$	<u> </u>			
	Inclusve	0.39 ± 0.16	0.03 ± 0.07	0.04 ± 0.05	
	1 lepton	_	_	ı — İ	_
$t\bar{t} + W \rightarrow \ell\nu$, amenlo pythia8	1 4 1	_	_	. – '	_
	1 lepton, from W				
to W .es, amenio pythiae	1 lepton, from t	_	_		_
to prove amenio prome	1 lepton, from t \geq 2 leptons	0.39 ± 0.16	0.03 ± 0.07	0.04 ± 0.05	_
	1 lepton, from t	0.39 ± 0.16	0.03 ± 0.07	_	

Table 6 - continued from previous page

	Tuble 6 collen	ided from previous pa		0.1.1	81.
		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	0.10 ± 0.05	_	_	_
	1 lepton		_	_	_
.=	1 lepton, from W	_	_	_	_
$t\bar{t} + W \rightarrow QQ$, amcnlo pythia8	1 lepton, from t	_	_	_	_
	> 2 leptons	0.10 ± 0.05	_	_	
	$Z \rightarrow \nu \nu$		_	_	_
	Inclusve	1.59 ± 0.04	0.52 ± 0.02	0.16 ± 0.01	0.09 ± 0.01
	1 lepton	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	
_	1 lepton, from W				
$t\bar{t} + Z$	1 lepton, from t	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	_
	> 2 leptons	0.02 + 0.01	0.00 + 0.00	0.00 + 0.00	
	$Z \rightarrow \nu \nu$	1.57 ± 0.04	0.51 ± 0.02	0.16 ± 0.01	0.09 ± 0.01
	Inclusve	1.59 ± 0.04	0.52 ± 0.02	0.16 ± 0.01	0.09 ± 0.01
	1 lepton	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.03 ± 0.01
	1 lepton, from W	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	
$t\bar{t} + Z$, madgraph	1 lepton, from t	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	_
	> 2 leptons	0.02 ± 0.01	0.00 ± 0.00	0.00 ± 0.00	_
	$Z \rightarrow \nu \nu$	1.57 ± 0.04	0.51 ± 0.02	0.16 ± 0.01	0.09 ± 0.01
	Inclusve	0.07 ± 0.05		-0.02 ± 0.02	
	1 lepton	0.07 ± 0.00		-0.02 ± 0.02	
	1 lepton, from W			_	
$t\bar{t} + Z \rightarrow QQ$, amenlo pythia8	1 lepton, from t		_	_	
	> 2 leptons	0.07 ± 0.05		-0.02 ± 0.02	
	$Z \rightarrow \nu \nu$	0.07 ± 0.00		-0.02 ± 0.02	
	Inclusve	1.45 ± 0.37	0.42 ± 0.17	0.30 ± 0.13	0.17 ± 0.07
	1 lepton	1.40 ± 0.37	0.42 ± 0.17	0.30 ± 0.13	0.17 ± 0.07
	1 lepton, from W	_	_	_	
$t\bar{t} + Z \rightarrow 2\ell 2\nu$, amcnlo pythia8	1 lepton, from t	_	_	_	
	> 2 leptons	-0.04 ± 0.04		_	_
			0.49 ± 0.17	0.20 ± 0.12	0.17 ± 0.07
	$Z \rightarrow \nu \nu$	1.49 ± 0.37	0.42 ± 0.17	0.30 ± 0.13	0.17 ± 0.07

CR0b, Nominal Systematic, Yield Table for Input Samples

CR0b, Nomin	nal Systematic, Yield T	able for Input Samples		
		≥4jets	≥4jets	\geq 4jets
Sample	Classification	MT2W < 200	MT2W < 200	MT2W < 200
		250 < MET < 350	350 < MET < 450	MET > 450
Data, single e/μ , MET	Inclusve	87.00 ± 9.33	20.00 ± 4.47	15.00 ± 3.87
	Inclusve	117.01 ± 5.55	24.58 ± 2.64	6.61 ± 0.73
	1 lepton	35.82 ± 4.29	10.71 ± 2.20	1.66 ± 0.29
	1 lepton, from W	32.67 ± 4.14	10.71 ± 2.20 10.62 ± 2.20	1.43 ± 0.24
All Background	1 lepton, from t	3.15 ± 1.11	0.09 ± 0.09	0.23 ± 0.15
	> 2 leptons	73.46 ± 3.40	12.75 ± 1.38	3.86 ± 0.60
	$Z \rightarrow \nu \nu$	7.73 ± 0.89	1.12 ± 0.45	1.09 ± 0.29
	Inclusve	72.12 ± 3.29		3.55 ± 0.58
	1 lepton	3.14 ± 1.11	11.60 ± 1.34 0.09 ± 0.09	0.21 ± 0.15
	1 lepton, from W	3.14 ± 1.11	0.09 ± 0.09	0.21 ± 0.13
$tar{t}$		2 14 ± 1 11	0.00 ± 0.00	0.21 ± 0.15
	1 lepton, from t	3.14 ± 1.11	0.09 ± 0.09	
	≥ 2 leptons	68.98 ± 3.10	11.51 ± 1.33	3.35 ± 0.56
	$Z \rightarrow \nu \nu$	_		
	Inclusve	2.30 ± 1.06	-	_
	1 lepton	2.30 ± 1.06	-	_
$t\bar{t}$, single lepFromT, madgraph pythia8	1 lepton, from W	_	-	_
, , , , , , , , , , , , , , , , , , , ,	1 lepton, from t	2.30 ± 1.06	-	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	
	Inclusve	0.85 ± 0.34	0.09 ± 0.09	0.21 ± 0.15
	1 lepton	0.85 ± 0.34	0.09 ± 0.09	0.21 ± 0.15
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	1 lepton, from W	_	-	_
te, single teprioniroar, maugraph pyemao, exer	1 lepton, from t	0.85 ± 0.34	0.09 ± 0.09	0.21 ± 0.15
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	<u> </u>	
	Inclusve	68.98 ± 3.10	11.51 ± 1.33	3.35 ± 0.56
	1 lepton	_	_	_
$t\bar{t}$, diLepton, madgraph pythia8, ext1	1 lepton, from W	_	_	_
tt, dibepton, madgraph pytmao, exti	1 lepton, from t	_	_	_
	≥ 2 leptons	68.98 ± 3.10	11.51 ± 1.33	3.35 ± 0.56
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	1.24 ± 1.24	_	
	1 lepton	_	-	_
single t	1 lepton, from W	_	_	_
single t	1 lepton, from t	_	_	_
	≥ 2 leptons	1.24 ± 1.24	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	1.24 ± 1.24	_	_
	1 lepton	_	-	_
single $t t - W$ -channel	1 lepton, from W	_	_	_
single t t - w -channel	1 lepton, from t	_	_	_
	≥ 2 leptons	1.24 ± 1.24	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	_	_	_
	1 lepton	_	_	_
: 1 / / III 1 1 1 1 0	1 lepton, from W	_	_	_
single $t, t - W$ -channel, powheg pythia8	1 lepton, from t	_	_	_
	> 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	1.24 ± 1.24	_	_
	1 lepton	ı <u>-</u> 1	_	_
: 1 7 / TT7 1 1 1 1 1:0	1 lepton, from W		_	_
single \bar{t} , $t-W$ -channel, powheg pythia8	1 lepton, from t		_	_
	> 2 leptons	1.24 ± 1.24	_	_
	$Z \rightarrow \nu \nu$		_	_
	Inclusve	_		_
	1 lepton	_	_	_
	1 lepton, from W	_	_	
single t non $t - W$ -channel	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$		_	

Table 7 - continued from previous 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	_	_	_
	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 ± 4.05	9.96 ± 2.14	1.42 ± 0.24
	1 lepton	30.59 ± 4.05	9.96 ± 2.14	1.42 ± 0.24
	1 lepton, from W	30.59 ± 4.05	9.96 ± 2.14	1.42 ± 0.24
V + Jets	1 lepton, from t		- 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		_	_
2 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	1 lepton, from t	_	_	_
	≥ 2 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	30.59 ± 4.05	9.96 ± 2.14	1.42 ± 0.24
	1 lepton	30.59 ± 4.05	9.96 ± 2.14	1.42 ± 0.24
$W+Jets \rightarrow \ell u$	1 lepton, from W	30.59 ± 4.05	9.96 ± 2.14	1.42 ± 0.24
W+Jets→ ℓν	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	1.29 ± 1.29	1.11 ± 1.11	_
	1 lepton	1.29 ± 1.29	1.11 ± 1.11	_
W. I-t- /- 100 < UT < 200 thi-8	1 lepton, from W	1.29 ± 1.29	1.11 ± 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 ± 2.71	1.59 ± 0.92	_
	1 lepton	11.49 ± 2.71	1.59 ± 0.92	_
*****	1 lepton, from W	11.49 ± 2.71	1.59 ± 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 ± 2.61	3.97 ± 1.50	
	1 lepton	10.08 ± 2.61	3.97 ± 1.50 3.97 ± 1.50	
	1 lepton, from W	10.08 ± 2.61	3.97 ± 1.50 3.97 ± 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 ± 0.39	0.63 ± 0.19
	Inclusve 1 lepton	4.20 ± 0.60	2.07 ± 0.39	0.63 ± 0.19
W+Jets $\rightarrow \ell \nu$, 600 < HT < 800, madgraph pythia8	Inclusve 1 lepton 1 lepton, from W	4.20 ± 0.60 4.20 ± 0.60	2.07 ± 0.39 2.07 ± 0.39	
W+Jets — $\ell\nu,600 < HT < 800,{\rm madgraph~pythia8}$	Inclusve 1 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 ± 0.39 2.07 ± 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 ± 0.60 4.20 ± 0.60	2.07 ± 0.39 2.07 ± 0.39	0.63 ± 0.19

Table 7 - continued from previous 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	2.47 ± 0.23	0.71 ± 0.12	0.61 ± 0.10
	1 lepton	2.47 ± 0.23	0.71 ± 0.12	0.61 ± 0.10
W. T	1 lepton, from W	2.47 ± 0.23	0.71 ± 0.12	0.61 ± 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 ± 0.37	0.50 ± 0.25	0.17 ± 0.12
	1 lepton	1.03 ± 0.37	0.50 ± 0.25	0.17 ± 0.12
W. I. 4 1000 - HTE - 0500 1 1 (1) 0	1 lepton, from W	1.03 ± 0.37	0.50 ± 0.25	0.17 ± 0.12
$V + \text{Jets} \rightarrow \ell \nu$, 1200 $< HT < 2500$, madgraph pythia8	1 lepton, from t	_	_	_
	> 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	0.03 ± 0.01	0.01 ± 0.01	0.01 ± 0.00
	1 lepton	0.03 ± 0.01	0.01 ± 0.01	0.01 ± 0.00
William Coron CHEST C. 1. 1. 11. 0	1 lepton, from W	0.03 ± 0.01	0.01 ± 0.01	0.01 ± 0.00
W+Jets $\rightarrow \ell \nu$, 2500 $<$ HT $<$ Inf , madgraph pythia8	1 lepton, from t	_	_	_
	≥ 2 leptons	-	_	_
	$Z \rightarrow \nu \nu$	-	_	_
	Inclusve	13.06 ± 1.41	3.02 ± 0.78	1.64 ± 0.36
	1 lepton	2.09 ± 0.86	0.66 ± 0.53	0.03 ± 0.03
Rare	1 lepton, from W	2.08 ± 0.86	0.66 ± 0.53	0.01 ± 0.02
Rare	1 lepton, from t	0.01 ± 0.00	0.00 ± 0.00	0.02 ± 0.02
	≥ 2 leptons	3.24 ± 0.67	1.24 ± 0.36	0.51 ± 0.22
	$Z \rightarrow \nu \nu$	7.73 ± 0.89	1.12 ± 0.45	1.09 ± 0.29
	Inclusve	10.96 ± 1.39	2.49 ± 0.78	1.49 ± 0.36
	1 lepton	2.05 ± 0.86	0.66 ± 0.53	0.01 ± 0.02
diBoson	1 lepton, from W	2.05 ± 0.86	0.66 ± 0.53	0.01 ± 0.02
diboson	1 lepton, from t	_	_	_
	\geq 2 leptons	3.09 ± 0.64	1.11 ± 0.35	0.47 ± 0.21
	$Z \rightarrow \nu \nu$	5.82 ± 0.89	0.73 ± 0.45	1.01 ± 0.29
	Inclusve	3.96 ± 1.05	1.47 ± 0.62	0.47 ± 0.21
	1 lepton	1.19 ± 0.84	0.52 ± 0.52	_
WW	1 lepton, from W	1.19 ± 0.84	0.52 ± 0.52	_
** **	1 lepton, from t	_	_	_
	≥ 2 leptons	2.77 ± 0.62	0.95 ± 0.34	0.47 ± 0.21
	$Z \rightarrow \nu \nu$	_		
	Inclusve	2.77 ± 0.62	0.95 ± 0.34	0.47 ± 0.21
	1 lepton	_	_	_
$WW \rightarrow 2\ell 2\nu$, powheg	1 lepton, from W	_	_	_
WWW. Zezz, powneg	1 lepton, from t		.	_
	≥ 2 leptons	2.77 ± 0.62	0.95 ± 0.34	0.47 ± 0.21
	$Z \rightarrow \nu \nu$	_		
	Inclusve	1.19 ± 0.84	0.52 ± 0.52	_
	1 lepton	1.19 ± 0.84	0.52 ± 0.52	_
$WW \rightarrow \ell \nu qq$, powheg	1 lepton, from W	1.19 ± 0.84	0.52 ± 0.52	_
**/ F · · · · · · · · · · · · · · · · · ·	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$			
	Inclusve	6.83 ± 0.91	0.99 ± 0.46	1.01 ± 0.29
	1 lepton	0.86 ± 0.18	0.13 ± 0.08	0.01 ± 0.02
WZ	1 lepton, from W	0.86 ± 0.18	0.13 ± 0.08	0.01 ± 0.02
	1 lepton, from t			_
	≥ 2 leptons	0.31 ± 0.13	0.15 ± 0.09	
	$Z \rightarrow \nu \nu$	5.65 ± 0.89	0.70 ± 0.45	0.99 ± 0.29
		0.31 ± 0.13	0.15 ± 0.09	_
	Inclusve			
	1 lepton	_	_	_
$WZ \rightarrow 3\ell\nu$, powheg pythia8	1 lepton 1 lepton, from W	_	=	_
$WZ \rightarrow 3\ell\nu$, powheg pythia8	1 lepton 1 lepton, from W 1 lepton, from t	_	_	
$WZ \! o \! 3\ell \nu$, powheg pythia 8	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \end{array}$	0.31 ± 0.13	0.15 ± 0.09	
$WZ \! o \! 3\ell \nu$, powheg pythia8	1 lepton 1 lepton, from W 1 lepton, from t	_	$0.15 \stackrel{-}{\pm} 0.09$	— — — — 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 ± 0.02	_	_
	1 lepton	_	_	_
$WZ\rightarrow 2\ell 2Q$, amenlo pythia8	1 lepton, from W	_	_	_
W Z → 2€2Q, amenio pytinas	1 lepton, from t	_	_	_
	≥ 2 leptons	0.01 ± 0.02	_	_
	$Z \rightarrow \nu \nu$	-	-	
	Inclusve	0.86 ± 0.18	0.13 ± 0.08	0.01 ± 0.02
	1 lepton	0.86 ± 0.18	0.13 ± 0.08	0.01 ± 0.02
$WZ \rightarrow \ell \nu 2Q$, amenlo pythia8	1 lepton, from W	0.86 ± 0.18	0.13 ± 0.08	0.01 ± 0.02
	1 lepton, from t > 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	5.65 ± 0.89	0.70 ± 0.45	0.99 ± 0.29
	1 lepton	5.05 ± 0.89	0.70 ± 0.45	0.99 ± 0.29
	1 lepton from W			
$WZ \rightarrow 1\ell 3\nu$, amenlo pythia8	1 lepton, from t	_		_
	> 2 leptons	_		_
	$Z \rightarrow \nu \nu$	5.65 ± 0.89	0.70 ± 0.45	0.99 ± 0.29
	Inclusve	0.17 ± 0.03	0.03 ± 0.01	0.01 ± 0.00
	1 lepton	_	_	_
ZZ	1 lepton, from W	_	_	_
22	1 lepton, from t	_	_	_
	≥ 2 leptons	0.00 ± 0.02	0.01 ± 0.01	_
	$Z \rightarrow \nu \nu$	0.17 ± 0.02	0.03 ± 0.01	0.01 ± 0.00
	Inclusve	0.00 ± 0.02	0.01 ± 0.01	_
	1 lepton	_	_	_
$ZZ\rightarrow 2\ell 2Q$, amenlo pythia8	1 lepton, from W	_	_	_
10	1 lepton, from t			_
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	0.00 ± 0.02	0.01 ± 0.01	_
				0.01 ± 0.00
	Inclusve 1 lepton	0.16 ± 0.02	0.03 ± 0.01	0.01 ± 0.00
	1 lepton from W	_		_
$ZZ\rightarrow 2\ell 2\nu$, powheg pythia8	1 lepton, from t			_
	> 2 leptons	_		_
	$Z \rightarrow \nu \nu$	0.16 ± 0.02	0.03 ± 0.01	0.01 ± 0.00
	Inclusve	0.00 ± 0.01	_	_
	1 lepton	_	_	_
77 2024 amenta pythias	1 lepton, from W	_	_	_
$ZZ\rightarrow 2Q2\nu$, amcnlo pythia8	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	0.00 ± 0.01	_	_
	Inclusve	2.11 ± 0.23	0.53 ± 0.10	0.15 ± 0.06
	1 lepton	0.04 ± 0.03	0.00 ± 0.00	0.02 ± 0.02
$t\bar{t} + V$	1 lepton, from W	0.03 ± 0.03		
•	1 lepton, from t	0.01 ± 0.00	0.00 ± 0.00	0.02 ± 0.02
	≥ 2 leptons	0.15 ± 0.22	0.13 ± 0.09	0.04 ± 0.06
	$Z \rightarrow \nu \nu$	1.91 ± 0.05	0.39 ± 0.02	0.09 ± 0.01
	Inclusve 1 lepton	0.15 ± 0.23 0.03 ± 0.03	0.13 ± 0.09	0.06 ± 0.06
	1 lepton 1 lepton, from W	0.03 ± 0.03 0.03 ± 0.03		0.02 ± 0.02
$t\bar{t}+W$	1 lepton, from t	0.03 ± 0.03		0.02 ± 0.02
	> 2 leptons	0.12 ± 0.22	0.13 ± 0.09	0.02 ± 0.02 0.04 ± 0.06
	$Z \rightarrow \nu \nu$	- 0.22	- 0.00	
	Inclusve	-0.03 ± 0.19	0.06 ± 0.08	0.02 ± 0.04
	1 lepton	0.03 ± 0.03		
4F W . 6	1 lepton, from W	0.03 ± 0.03	_	_
$t\bar{t} + W \rightarrow \ell\nu$, amenlo pythia8	1 lepton, from t	_	_	_
	≥ 2 leptons	-0.07 ± 0.19	0.06 ± 0.08	0.02 ± 0.04
	$Z \rightarrow \nu \nu$		<u> </u>	
			Continu	ed on next page

Table 7 - continued from previous page

Table 7 – 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					
$t \bar{t} + W \rightarrow Q Q$, amenlo pythia 8	Inclusve 1 lepton 1 lepton, from W 1 lepton, from $t \geq 2$ leptons $Z \rightarrow \nu\nu$	$\begin{array}{c} 0.19 \pm 0.12 \\$	0.07 ± 0.05	$\begin{array}{c} 0.04 \pm 0.04 \\ 0.02 \pm 0.02 \\$					
$tar{t}+Z$	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 ± 0.02 0.00 ± 0.00 0.00 ± 0.00 0.00 ± 0.00 0.39 ± 0.02	$\begin{array}{c} 0.09 \pm 0.01 \\ 0.00 \pm 0.00 \\ \hline \\ 0.00 \pm 0.00 \\ 0.00 \pm 0.00 \\ 0.09 \pm 0.01 \end{array}$					
$tar{t}+Z,{ m madgraph}$	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 ± 0.02 0.00 ± 0.00 0.00 ± 0.00 0.00 ± 0.00 0.39 ± 0.02	$\begin{array}{c} 0.09 \pm 0.01 \\ 0.00 \pm 0.00 \\$					
$tar{t} + Z \! ightarrow \! QQ$, amenlo pythia 8	Inclusve 1 lepton 1 lepton, from W 1 lepton, from t \geq 2 leptons $Z \rightarrow \nu \nu$	0.27 ± 0.18 $ 0.27 \pm 0.18$ $ 0.27 \pm 0.18$	-0.11 ± 0.10 	0.21 ± 0.14 $ 0.21 \pm 0.14$ $ 0.21 \pm 0.14$					
$tar{t} + Z \! ightarrow \! 2\ell 2 \nu,$ amc nlo pythia 8	Inclusve 1 lepton 1 lepton, from W 1 lepton, from t \geq 2 leptons $Z \rightarrow \nu \nu$	$\begin{array}{c} 2.66 \pm 0.53 \\$	0.33 ± 0.21 	$\begin{array}{c} 0.19 \pm 0.12 \\$					

CR0b, Nominal Systematic, Yield Table for Input Samples

Sample Data, single e/μ , MET	Classification Inclusve	24jets $MT2W \ge 200$ $250 < MET < 350$ 86.00 ± 9.27	\geq 4jets MT2W \geq 200 350 < MET < 450 32.00 \pm 5.66	24jets $MT2W \ge 200$ $450 < MET < 550$ 6.00 ± 2.45	\geq 4 jets MT2W \geq 200 550 < MET < 650	\geq 4 jets MT2W \geq 200 MET > 650
_		250 < MET < 350	350 < MET < 450	450 < MET < 550	550 < MET < 650	MET > 650
		250 < MET < 350	350 < MET < 450	450 < MET < 550	550 < MET < 650	MET > 650
Data, single e/μ , MET	Inclusve					
Data, single e/μ , MET	Inclusve	86.00 ± 9.27	22.00 ± 5.66	0.00 0.45		
Bata, single e/μ, MB1	Inclusve				6.00 ± 2.45	7.00 ± 2.65
			32.00 ± 0.00	0.00 ± 2.40	0.00 ± 2.40	1.00 ± 2.00
	Inclusve	118.69 ± 11.74	34.69 ± 3.03	13.45 ± 1.72	7.70 ± 1.63	5.91 ± 1.11
All Background	1 lepton	61.99 ± 5.44	21.62 ± 2.79	9.22 ± 1.60	4.53 ± 0.97	4.62 ± 1.06
	1 lepton, from W	60.31 ± 5.42	21.33 ± 2.78	9.22 ± 1.60	4.53 ± 0.97	4.56 ± 1.06
	1 lepton, from t	1.68 ± 0.55	0.29 ± 0.28	_	_	0.06 ± 0.06
	> 2 leptons	49.14 ± 10.35	8.75 ± 0.97	1.78 ± 0.41	2.40 ± 1.29	0.48 ± 0.20
	$Z \rightarrow \nu \nu$	7.55 ± 0.98	4.32 ± 0.67	2.45 ± 0.48	0.77 ± 0.26	0.81 ± 0.25
	Inclusve	30.70 ± 2.14	6.83 ± 0.90	1.32 ± 0.34	0.62 ± 0.25	0.26 ± 0.13
	1 lepton	1.64 ± 0.55	0.28 ± 0.28			0.06 ± 0.06
		1.01 ± 0.00	0.20 ± 0.20			0.00 ± 0.00
$tar{t}$	1 lepton, from W	-	-	_	_	
	1 lepton, from t	1.64 ± 0.55	0.28 ± 0.28	_	_	0.06 ± 0.06
	> 2 leptons	29.06 ± 2.07	6.54 ± 0.86	1.32 ± 0.34	0.62 ± 0.25	0.20 ± 0.12
	$Z \rightarrow \nu \nu$	- · · · · - · · ·				
				_		
	Inclusve	0.41 ± 0.41	0.28 ± 0.28	_	_	_
	1 lepton	0.41 ± 0.41	0.28 ± 0.28	_	_	_
	1 lepton, from W		0.20 2 0.20			
$t\bar{t}$, single lepFromT, madgraph pythia8		0.41 / 0.41		_	_	
tt, single teprionir, madgraph pythiad	1 lepton, from t	0.41 ± 0.41	0.28 ± 0.28	_	_	_
	> 2 leptons	<u> </u>			_	_
	$Z \rightarrow \nu \nu$	<u> </u>			_	_
		4 22 1 2 22				0.00 0.00
	Inclusve	1.23 ± 0.36	_	_	_	0.06 ± 0.06
	1 lepton	1.23 ± 0.36	_	_	_	0.06 ± 0.06
	1 lepton, from W					_
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	1 lepton, from t	1.23 ± 0.36				0.06 ± 0.06
		1.25 ± 0.30	_	_	_	0.06 ± 0.06
	≥ 2 leptons	_	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_	
	Inclusve	29.06 ± 2.07	6.54 ± 0.86	1.32 ± 0.34	0.62 ± 0.25	0.20 ± 0.12
		23.00 ± 2.01	0.04 ± 0.00	1.02 ± 0.04	0.02 ± 0.20	0.20 ± 0.12
	1 lepton		_	_	_	_
$t\bar{t}$, diLepton, madgraph pythia8, ext1	1 lepton, from W	-	_	_	_	_
tt, dilepton, madgraph pythias, exti	1 lepton, from t					_
	> 2 leptons	29.06 ± 2.07	6.54 ± 0.86	1.32 ± 0.34	0.62 ± 0.25	0.20 ± 0.12
		29.00 ± 2.07	0.54 ± 0.86	1.32 ± 0.34	0.02 ± 0.23	0.20 ± 0.12
	Z ightarrow u u	_	_	_	_	_
single t	Inclusve	2.22 ± 1.58	_	_	1.24 ± 1.24	_
	1 lepton	1.19 ± 1.19	_		_	
	1 lepton, from W	1.19 ± 1.19	_	_	_	_
	1 lepton, from t	-	_	_	_	_
	> 2 leptons	1.03 ± 1.03	_		1.24 ± 1.24	_
	$Z \rightarrow \nu \nu$					
			_	_		
single t t $ W$ -channel	Inclusve	2.22 ± 1.58	_	_	1.24 ± 1.24	_
	1 lepton	1.19 ± 1.19	_	_	_	_
	1 lepton, from W	1.19 ± 1.19	_	_	_	_
		1.10 1 1.10				
	1 lepton, from t	.	_	_	.	_
	≥ 2 leptons	1.03 ± 1.03		_	1.24 ± 1.24	_
	$Z \rightarrow \nu \nu$	_	_		_	_
	Inclusve		_	_		
single $t,\ t-W$ -channel, powheg pythia8		_	_	_	_	
	1 lepton	_	_	_	_	_
	1 lepton, from W	-			_	_
	1 lepton, from t	_			_	_
	> 2 leptons	_				
		-	_	_	_	
	$Z \rightarrow \nu \nu$		_	_		
single $ar{t},\ t-W$ -channel, powheg pythia8	Inclusve	2.22 ± 1.58			1.24 ± 1.24	_
	1 lepton	1.19 ± 1.19				_
	1 lepton, from W	1.19 ± 1.19 1.19 ± 1.19				
		1.19 ± 1.19	_	_	_	_
	1 lepton, from t	_			_	_
	> 2 leptons	1.03 ± 1.03			1.24 ± 1.24	_
	$Z \rightarrow \nu \nu$		_	_		_
		_	_		_	
	Inclusve	_	_	_	_	_
	1 lepton	_		_	_	_
	1 lepton					
		<u>—</u>		_	_	
single t non $t-W$ -channel	1 lepton, from W	_	_	_	_	_
single t non $t-W$ -channel	1 lepton, from W 1 lepton, from t	_	_	_ _	_	_
single t non $t-W$ -channel	1 lepton, from W 1 lepton, from t \geq 2 leptons	_ _ _	_ _ _	_ _ _	=	
single t non $t-W$ -channel	1 lepton, from W 1 lepton, from t	 	_ _ _ _	_ _ _ _	_ _ _ _	

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 ± 11.26	20.56 ± 2.73	8.54 ± 1.53	4.06 ± 0.88	4.17 ± 1.01		
	1 lepton	53.82 ± 5.05	20.56 ± 2.73	8.54 ± 1.53	4.06 ± 0.88	4.17 ± 1.01 4.17 ± 1.01		
	1 lepton, from W	53.82 ± 5.05	20.56 ± 2.73	8.54 ± 1.53	4.06 ± 0.88	4.17 ± 1.01 4.17 ± 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 ± 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 ± 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 ± 10.06		_		_		
	$Z \rightarrow \nu \nu$	14.25 ± 10.00		_				
	Inclusve	53.82 ± 5.05	20.56 ± 2.73	8.54 ± 1.53	4.06 ± 0.88	4.17 ± 1.01		
	1 lepton	53.82 ± 5.05	20.56 ± 2.73	8.54 ± 1.53	4.06 ± 0.88	4.17 ± 1.01 4.17 ± 1.01		
	1 lepton, from W	53.82 ± 5.05	20.56 ± 2.73	8.54 ± 1.53	4.06 ± 0.88	4.17 ± 1.01 4.17 ± 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 ± 0.71		
	1 lepton	2.68 ± 1.90	_	_	_	0.71 ± 0.71		
	1 lepton, from W	2.68 ± 1.90	_	_	_	0.71 ± 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 ± 1.50	1.03 ± 0.73	_	0.31 ± 0.31		
	1 lepton	16.26 ± 3.20	3.92 ± 1.50	1.03 ± 0.73	_	0.31 ± 0.31		
MILT. 4 000 CHT C 400 1 1 11 11 1	1 lepton, from W	16.26 ± 3.20	3.92 ± 1.50	1.03 ± 0.73	_	0.31 ± 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 ± 3.21	7.75 ± 2.16	2.76 ± 1.23	1.40 ± 0.81	1.02 ± 0.59		
	1 lepton	15.73 ± 3.21	7.75 ± 2.16	2.76 ± 1.23	1.40 ± 0.81	1.02 ± 0.59		
MILT. 4 400 CHTC COO. 1 1 1110	1 lepton, from W	15.73 ± 3.21	7.75 ± 2.16	2.76 ± 1.23	1.40 ± 0.81	1.02 ± 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 ± 0.87	3.38 ± 0.50	2.48 ± 0.43	0.97 ± 0.24	0.40 ± 0.13		
	1 lepton	8.88 ± 0.87	3.38 ± 0.50	2.48 ± 0.43	0.97 ± 0.24	0.40 ± 0.13		
W+Jets $\rightarrow \ell \nu$, 600 < HT < 800, madgraph pythia8	1 lepton, from W	8.88 ± 0.87	3.38 ± 0.50	2.48 ± 0.43	0.97 ± 0.24	0.40 ± 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≥ 200	MT2W≥ 200	MT2W≥ 200	MT2W≥ 200	$MT2W \ge 200$		
		250 < MET < 350	350 < MET < 450	450 < MET < 550	550 < MET < 650	MET > 650		
	Inclusve	7.02 ± 0.40	3.38 ± 0.26	1.58 ± 0.17	1.01 ± 0.12	0.92 ± 0.10		
	1 lepton	7.02 ± 0.40	3.38 ± 0.26	1.58 ± 0.17	1.01 ± 0.12	0.92 ± 0.10		
**** *	1 lepton, from W	7.02 ± 0.40	3.38 ± 0.26	1.58 ± 0.17	1.01 ± 0.12	0.92 ± 0.10		
W+Jets $\rightarrow \ell \nu$, 800 < HT < 1200, madgraph pythia8	1 lepton, from t	_	_	_	_	_		
	> 2 leptons	_	_	_	_	_		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
	Inclusve	2.98 ± 0.61	2.00 ± 0.47	0.63 ± 0.26	0.67 ± 0.24	0.77 ± 0.22		
	1 lepton	2.98 ± 0.61	2.00 ± 0.47	0.63 ± 0.26	0.67 ± 0.24	0.77 ± 0.22		
W Jota # 1200 < HT < 2500 madg==-1+1:-9	1 lepton, from W	2.98 ± 0.61	2.00 ± 0.47	0.63 ± 0.26	0.67 ± 0.24	0.77 ± 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 ± 0.02	0.06 ± 0.01	0.02 ± 0.01	0.05 ± 0.01		
	1 lepton	0.26 ± 0.03	0.14 ± 0.02	0.06 ± 0.01	0.02 ± 0.01	0.05 ± 0.01		
THE TAX OF CO. S. HETT S. T. C 1. 1. (1) O.	1 lepton, from W	0.26 ± 0.03	0.14 ± 0.02	0.06 ± 0.01	0.02 ± 0.01	0.05 ± 0.01		
W+Jets $\rightarrow \ell \nu$, 2500 $< HT < Inf$, madgraph pythia8	1 lepton, from t	_	_	_	_	_		
	≥ 2 leptons	_	_	_	_	_		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
	Inclusve	17.71 ± 2.01	7.30 ± 0.96	3.60 ± 0.71	1.78 ± 0.53	1.48 ± 0.44		
	1 lepton	5.34 ± 1.57	0.77 ± 0.52	0.68 ± 0.48	0.46 ± 0.40	0.39 ± 0.32		
Rare	1 lepton, from W	5.30 ± 1.57	0.77 ± 0.52	0.68 ± 0.48	0.46 ± 0.40	0.39 ± 0.32		
Itale	1 lepton, from t	0.04 ± 0.03	0.00 ± 0.00	_	_	_		
	\geq 2 leptons	4.82 ± 0.79	2.21 ± 0.45	0.46 ± 0.22	0.54 ± 0.24	0.29 ± 0.16		
	$Z \rightarrow \nu \nu$	7.55 ± 0.98	4.32 ± 0.67	2.45 ± 0.48	0.77 ± 0.26	0.81 ± 0.25		
	Inclusve	15.49 ± 1.99	5.93 ± 0.94	3.32 ± 0.70	1.71 ± 0.53	1.52 ± 0.44		
	1 lepton	5.35 ± 1.57	0.77 ± 0.52	0.68 ± 0.48	0.46 ± 0.40	0.39 ± 0.32		
diBoson	1 lepton, from W	5.35 ± 1.57	0.77 ± 0.52	0.68 ± 0.48	0.46 ± 0.40	0.39 ± 0.32		
	1 lepton, from t	<u> </u>	-		-	_		
	≥ 2 leptons	4.09 ± 0.74	1.54 ± 0.42	0.45 ± 0.20	0.55 ± 0.23	0.35 ± 0.16		
	$Z \rightarrow \nu \nu$	6.06 ± 0.98	3.63 ± 0.67	2.19 ± 0.48	0.69 ± 0.26	0.77 ± 0.25		
	Inclusve	7.81 ± 1.72	1.93 ± 0.65	0.80 ± 0.51	0.90 ± 0.46	0.67 ± 0.36		
	1 lepton	4.10 ± 1.55	0.51 ± 0.51	0.47 ± 0.47	0.40 ± 0.40	0.32 ± 0.32		
WW	1 lepton, from W	4.10 ± 1.55	0.51 ± 0.51	0.47 ± 0.47	0.40 ± 0.40	0.32 ± 0.32		
	1 lepton, from t							
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	3.71 ± 0.73	1.42 ± 0.41	0.33 ± 0.19	0.51 ± 0.23	0.35 ± 0.16		
	Inclusve	3.71 ± 0.73	1.42 ± 0.41	0.33 ± 0.19	0.51 ± 0.23	0.35 ± 0.16		
	1 lepton	3.71 ± 0.73	1.42 ± 0.41	0.33 ± 0.19	0.51 ± 0.25	0.35 ± 0.16		
	1 lepton, from W		_					
$WW \rightarrow 2\ell 2\nu$, powheg	1 lepton, from t		_					
	> 2 leptons	3.71 ± 0.73	1.42 ± 0.41	0.33 ± 0.19	0.51 ± 0.23	0.35 ± 0.16		
	$Z \rightarrow \nu \nu$	3.71 ± 0.73		0.33 ± 0.19	0.51 ± 0.25	3.55 ± 0.10		
	Inclusve	4.10 ± 1.55	0.51 ± 0.51	0.47 ± 0.47	0.40 ± 0.40	0.32 ± 0.32		
	1 lepton	4.10 ± 1.55	0.51 ± 0.51 0.51 ± 0.51	0.47 ± 0.47 0.47 ± 0.47	0.40 ± 0.40 0.40 ± 0.40	0.32 ± 0.32 0.32 ± 0.32		
	1 lepton, from W	4.10 ± 1.55 4.10 ± 1.55	0.51 ± 0.51 0.51 ± 0.51	0.47 ± 0.47 0.47 ± 0.47	0.40 ± 0.40 0.40 ± 0.40	0.32 ± 0.32 0.32 ± 0.32		
$WW \rightarrow \ell \nu qq$, powheg	1 lepton, from t							
	> 2 leptons	_	_	_	_	_		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
	Inclusve	7.50 ± 1.01	3.91 ± 0.68	2.46 ± 0.49	0.79 ± 0.26	0.83 ± 0.25		
	1 lepton	1.24 ± 0.20	0.26 ± 0.12	0.21 ± 0.08	0.07 ± 0.05	0.07 ± 0.03		
	1 lepton, from W	1.24 ± 0.20	0.26 ± 0.12	0.21 ± 0.08	0.07 ± 0.05	0.07 ± 0.03		
WZ	1 lepton, from t							
	> 2 leptons	0.38 ± 0.13	0.11 ± 0.08	0.12 ± 0.07	0.05 ± 0.04	_		
	$Z \rightarrow \nu \nu$	5.88 ± 0.98	3.54 ± 0.67	2.12 ± 0.48	0.67 ± 0.26	0.76 ± 0.25		
	Inclusve	0.30 ± 0.12	0.13 ± 0.07	0.12 ± 0.07	0.03 ± 0.03	_		
	1 lepton	_	_	_	_	_		
$WZ \rightarrow 3\ell\nu$, powheg pythia8	1 lepton, from W	_	_	_	_	_		
** 2 - oce, powneg pythiao	1 lepton, from t	_	_	_	_	-		
	\geq 2 leptons	0.30 ± 0.12	0.13 ± 0.07	0.12 ± 0.07	0.03 ± 0.03	-		
	$Z \rightarrow \nu \nu$	_		_	_			
		·	·		Continu	ed on next page		

Table 8 - continued from previous 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	0.08 ± 0.03	-0.02 ± 0.02		0.01 ± 0.01				
	1 lepton	0.00 ± 0.00	-0.02 ± 0.02		0.01 ± 0.01				
	1 lepton, from W	_							
$WZ\rightarrow 2\ell 2Q$, amcnlo pythia8	1 lepton, from t								
	> 2 leptons	0.08 ± 0.03	-0.02 ± 0.02		0.01 ± 0.01				
	$Z \rightarrow \nu \nu$	0.00 ± 0.00	0.02 ± 0.02	_	0.01 ± 0.01	_			
	Inclusve	1.24 ± 0.20	0.26 ± 0.12	0.21 ± 0.08	0.07 ± 0.05	0.07 ± 0.03			
	1 lepton	1.24 ± 0.20	0.26 ± 0.12	0.21 ± 0.08	0.07 ± 0.05	0.07 ± 0.03			
	1 lepton, from W	1.24 ± 0.20	0.26 ± 0.12	0.21 ± 0.08	0.07 ± 0.05	0.07 ± 0.03			
$WZ\rightarrow \ell\nu 2Q$, amcnlo pythia8	1 lepton, from t				=				
	> 2 leptons	_	_	_	_	_			
	$Z \rightarrow \nu \nu$	_	_	_	_	_			
	Inclusve	5.88 ± 0.98	3.54 ± 0.67	2.12 ± 0.48	0.67 ± 0.26	0.76 ± 0.25			
	1 lepton								
W.7. 440	1 lepton, from W	_	_	_	_	_			
$WZ \rightarrow 1\ell 3\nu$, amenlo pythia8	1 lepton, from t	-	_	_	_	_			
	≥ 2 leptons	-	_	_	_	_			
	$Z \rightarrow \nu \nu$	5.88 ± 0.98	3.54 ± 0.67	2.12 ± 0.48	0.67 ± 0.26	0.76 ± 0.25			
	Inclusve	0.18 ± 0.02	0.09 ± 0.02	0.06 ± 0.01	0.01 ± 0.01	0.01 ± 0.00			
	1 lepton	_	_	_	_	_			
ZZ	1 lepton, from W	_	_	_	_	_			
	1 lepton, from t	_	_	_	_	_			
	\geq 2 leptons	0.00 ± 0.01	0.01 ± 0.01	_	_	_			
	$Z \rightarrow \nu \nu$	0.18 ± 0.02	0.09 ± 0.01	0.06 ± 0.01	0.01 ± 0.01	0.01 ± 0.00			
	Inclusve	0.00 ± 0.01	0.01 ± 0.01	_	_	_			
	1 lepton	_	_	_	_	_			
$ZZ\rightarrow 2\ell 2Q$, amenlo pythia8	1 lepton, from W	_	_	_	_	_			
	1 lepton, from t			_	_				
	≥ 2 leptons	0.00 ± 0.01	0.01 ± 0.01	_	_	_			
	$Z \rightarrow \nu \nu$								
	Inclusve	0.15 ± 0.01	0.09 ± 0.01	0.06 ± 0.01	0.01 ± 0.00	0.02 ± 0.00			
	1 lepton 1 lepton, from W	_	_	_	_				
$ZZ\rightarrow 2\ell 2\nu$, powheg pythia8	1 lepton, from t		_	_	-	_			
	> 2 leptons		_	_	-	_			
	$Z \rightarrow \nu \nu$	0.15 ± 0.01	0.09 ± 0.01	0.06 + 0.01	0.01 ± 0.00	0.02 ± 0.00			
	Inclusve	0.03 ± 0.01	-0.00 ± 0.01	0.00 ± 0.00	0.00 ± 0.01	-0.00 ± 0.00			
	1 lepton	0.03 ± 0.01	20.00 ± 0.01	0.00 ± 0.00	0.00 ± 0.01	-0.00 ± 0.00			
	1 lepton, from W	_	_	_	_				
$ZZ\rightarrow 2Q2\nu$, amcnlo pythia8	1 lepton, from t	_	_	_	_	_			
	> 2 leptons	_	_	_	_	_			
	$Z \rightarrow \nu \nu$	0.03 ± 0.01	-0.00 ± 0.01	0.00 ± 0.00	0.00 ± 0.01	-0.00 ± 0.00			
	Inclusve	2.22 ± 0.27	1.37 ± 0.18	0.28 ± 0.08	0.07 ± 0.07	-0.03 ± 0.05			
	1 lepton	-0.01 ± 0.06	0.00 ± 0.00	_	_				
$tar{t}+V$	1 lepton, from W	-0.05 ± 0.05	_	_	_	-			
ιι + v	1 lepton, from t	0.04 ± 0.03	0.00 ± 0.00	_	_	_			
	≥ 2 leptons	0.74 ± 0.26	0.67 ± 0.18	0.01 ± 0.08	-0.01 ± 0.07	-0.07 ± 0.05			
	$Z \rightarrow \nu \nu$	1.49 ± 0.04	0.70 ± 0.03	0.27 ± 0.02	0.08 ± 0.01	0.03 ± 0.00			
	Inclusve	0.71 ± 0.27	0.66 ± 0.18	0.00 ± 0.08	-0.01 ± 0.07	-0.07 ± 0.05			
	1 lepton	-0.01 ± 0.06	_	_	_	_			
$t\bar{t} + W$	1 lepton, from W	-0.05 ± 0.05	_	_	_	_			
00 T W	1 lepton, from t	0.03 ± 0.03	_	_	_	-			
	≥ 2 leptons	0.72 ± 0.26	0.66 ± 0.18	0.00 ± 0.08	-0.01 ± 0.07	-0.07 ± 0.05			
	$Z \rightarrow \nu \nu$	_	_	_		_			
	Inclusve	0.51 ± 0.25	0.54 ± 0.17	0.00 ± 0.08	0.01 ± 0.05	-0.08 ± 0.05			
	1 lepton	-0.05 ± 0.05	_	_	_	_			
$t\bar{t} + W \rightarrow \ell\nu$, amenlo pythia8	1 lepton, from W	-0.05 ± 0.05	_	_	_	_			
. , , , , , , , , , , , , , , , , , , ,	1 lepton, from t								
	≥ 2 leptons	0.56 ± 0.24	0.54 ± 0.17	0.00 ± 0.08	0.01 ± 0.05	-0.08 ± 0.05			
	$Z \rightarrow \nu \nu$	_	_	_					
					Continu	ed on next page			

Table 8 – continued from previous 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	0.20 ± 0.10	0.12 ± 0.06		-0.02 ± 0.05	0.01 ± 0.01		
	1 lepton	0.03 ± 0.03	0.12 ± 0.00	_	0.02 ± 0.00	- 0.01		
	1 lepton, from W	0.00 ± 0.00	_	_	_	_		
$t\bar{t} + W \rightarrow QQ$, amcnlo pythia8	1 lepton, from t	0.03 ± 0.03	_	_	_	_		
	> 2 leptons	0.16 ± 0.10	0.12 ± 0.06	_	-0.02 ± 0.05	0.01 ± 0.01		
	$Z \rightarrow \nu \nu$	0.10 ± 0.10	0.12 ± 0.00	_	0.02 ± 0.00			
	Inclusve	1.51 ± 0.04	0.71 ± 0.03	0.27 ± 0.02	0.08 ± 0.01	0.03 ± 0.00		
	1 lepton	0.01 ± 0.00	0.00 ± 0.00	0.27 ± 0.02	0.00 ± 0.01	0.03 ± 0.00		
	1 lepton, from W	0.01 ± 0.00	0.00 ± 0.00	_	_	_		
$t\bar{t} + Z$	1 lepton, from t	0.01 + 0.00	0.00 + 0.00	_	_	_		
	> 2 leptons	0.01 ± 0.00 0.02 ± 0.00	0.00 ± 0.00 0.01 ± 0.00	0.00 + 0.00	_	_		
	$Z \rightarrow \nu \nu$	1.49 ± 0.04	0.70 ± 0.03	0.00 ± 0.00 0.27 ± 0.02	0.08 ± 0.01	0.03 ± 0.00		
	Inclusve	1.51 ± 0.04	0.70 ± 0.03	0.27 ± 0.02 0.27 ± 0.02	0.08 ± 0.01	0.03 ± 0.00 0.03 ± 0.00		
	1 lepton	0.01 ± 0.00	0.71 ± 0.03 0.00 ± 0.00	0.27 ± 0.02	0.08 ± 0.01	0.03 ± 0.00		
17 d	1 lepton, from W	0.01 ± 0.00	0.00 ± 0.00	_	_	_		
$t\bar{t} + Z$, madgraph	1 lepton, from W 1 lepton, from t	0.01 ± 0.00	0.00 ± 0.00	_	_	_		
	> 2 leptons	0.01 ± 0.00 0.02 ± 0.00	0.00 ± 0.00 0.01 ± 0.00	0.00 ± 0.00	_	_		
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	0.02 ± 0.00 1.49 ± 0.04	0.01 ± 0.00 0.70 ± 0.03	0.00 ± 0.00 0.27 ± 0.02	0.08 ± 0.01	0.03 ± 0.00		
	Inclusve	0.22 ± 0.12	0.02 ± 0.05	_	_	-0.04 ± 0.03		
	1 lepton	0.04 ± 0.04	_	_	_	_		
$t\bar{t} + Z \rightarrow QQ$, amenlo pythia8	1 lepton, from W	l 	_	_	_	_		
13	1 lepton, from t	0.04 ± 0.04		_	_			
	≥ 2 leptons	0.18 ± 0.12	0.02 ± 0.05	_	_	-0.04 ± 0.03		
	$Z \rightarrow \nu \nu$	_	_	_	_	_		
	Inclusve	1.74 ± 0.50	1.49 ± 0.31	0.12 ± 0.16	0.18 ± 0.09	0.10 ± 0.05		
	1 lepton	_	_	_	_	_		
$t\bar{t} + Z \rightarrow 2\ell 2\nu$, amenlo pythia8	1 lepton, from W	_	_	_	_	_		
or i z z zz, amenie pytinae	1 lepton, from t	_	_	_	_	_		
	≥ 2 leptons	0.01 ± 0.05	0.00 ± 0.05	_	_	_		
	$Z \rightarrow \nu \nu$	1.73 ± 0.50	1.49 ± 0.31	0.12 ± 0.16	0.18 ± 0.09	0.10 ± 0.05		

CR21, Nominal Systematic, Yield Table for Input Samples

CR2l, Nominal Systematic, Yield Table for Input Samples							
	G1 16: 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			
Data, single e/μ , MET	Inclusve	265.00 ± 16.28	54.00 ± 7.35	13.00 ± 3.61			
	Inclusve	275.94 ± 19.67	47.78 ± 7.60	10.41 ± 1.11			
	1 lepton	8.03 ± 1.54	1.39 ± 0.29	0.43 ± 0.14			
A11 D1	1 lepton, from W	5.43 ± 1.40	0.81 ± 0.16	0.43 ± 0.14			
All Background	1 lepton, from t	2.60 ± 0.66	0.59 ± 0.24	_			
	≥ 2 leptons	266.17 ± 19.61	45.94 ± 7.59	9.78 ± 1.10			
	$Z \rightarrow \nu \nu$	1.75 ± 0.04	0.45 ± 0.02	0.20 ± 0.02			
	Inclusve	228.93 ± 3.83	33.75 ± 1.41	7.18 ± 0.70			
	1 lepton	2.50 ± 0.65	0.59 ± 0.24	_			
$tar{t}$	1 lepton, from W	_	_	_			
l l	1 lepton, from t	2.50 ± 0.65	0.59 ± 0.24	_			
	≥ 2 leptons	226.43 ± 3.78	33.16 ± 1.39	7.18 ± 0.70			
	$Z \rightarrow \nu \nu$	_	_	_			
	Inclusve	1.45 ± 0.60	0.18 ± 0.18	_			
	1 lepton	1.45 ± 0.60	0.18 ± 0.18	_			
4 1	1 lepton, from W	_	_	_			
$t\bar{t}$, single lepFromT, madgraph pythia8	1 lepton, from t	1.45 ± 0.60	0.18 ± 0.18	_			
	≥ 2 leptons	_	_	_			
	$Z \rightarrow \nu \nu$	_	_	_			
	Inclusve	1.04 ± 0.26	0.41 ± 0.16	_			
	1 lepton	1.04 ± 0.26	0.41 ± 0.16	_			
(T : 1 1 T) TP1	1 lepton, from W	_	_	_			
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	1 lepton, from t	1.04 ± 0.26	0.41 ± 0.16	_			
	≥ 2 leptons	_	_	_			
	$Z \rightarrow \nu \nu$	_	_	_			
	Inclusve	226.43 ± 3.78	33.16 ± 1.39	7.18 ± 0.70			
	1 lepton	_	_	_			
$t\bar{t}$, diLepton, madgraph pythia8, ext1	1 lepton, from W	_	_	_			
tt, dibepton, madgraph pytmas, exti	1 lepton, from t	_	_	_			
	\geq 2 leptons	226.43 ± 3.78	33.16 ± 1.39	7.18 ± 0.70			
	$Z \rightarrow \nu \nu$	_	_	_			
	Inclusve	14.08 ± 2.97	3.82 ± 1.46	1.24 ± 0.72			
	1 lepton	0.10 ± 0.10	_	_			
single t	1 lepton, from W	_	_	_			
511810	1 lepton, from t	0.10 ± 0.10	-	-			
	≥ 2 leptons	13.98 ± 2.97	3.82 ± 1.46	1.24 ± 0.72			
	$Z \rightarrow \nu \nu$			_			
	Inclusve	13.98 ± 2.97	3.82 ± 1.46	1.24 ± 0.72			
	1 lepton	_	_	_			
single $t \ t - W$ -channel	1 lepton, from W	_	_	_			
	1 lepton, from t	· · · · · · · · · · · · · · · · · · ·	l 	—			
	≥ 2 leptons	13.98 ± 2.97	3.82 ± 1.46	1.24 ± 0.72			
	$Z \rightarrow \nu \nu$	_	_	_			
	Inclusve	_	_	_			
	1 lepton	_	_	_			
single t , $t - W$ -channel, powheg pythia8	1 lepton, from W	_	_	_			
	1 lepton, from t	_	_	_			
	≥ 2 leptons	_	_	_			
	$Z \rightarrow \nu \nu$	12.09 ± 2.07	2 22 ± 1 46	1 24 ± 0.72			
	Inclusve	13.98 ± 2.97	3.82 ± 1.46	1.24 ± 0.72			
	1 lepton	_	_	_			
single \bar{t} , $t - W$ -channel, powheg pythia8	1 lepton, from W 1 lepton, from t	_	_	_			
	> 2 leptons	13.98 ± 2.97	3.82 ± 1.46	1.24 ± 0.72			
	$Z \rightarrow \nu \nu$	13.95 ± 2.91	3.02 £ 1.40	1.24 ± 0.72			
	Inclusve	0.10 ± 0.10					
	1 lepton	0.10 ± 0.10 0.10 ± 0.10	_	_			
	1 lepton 1 lepton W	0.10 ± 0.10	_	_			
single t non $t - W$ -channel	1 lepton, from w	0.10 ± 0.10	_	_			
	≥ 2 leptons	0.10 ± 0.10					
	$Z \rightarrow \nu \nu$						
	$Z \rightarrow \nu \nu$						
			Cor	ntinued 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 ± 0.10						
	1 lepton	0.10 ± 0.10 0.10 ± 0.10	-	_				
	1 lepton, from W	0.10 ± 0.10	-	_				
single t, s-channel, amenlo pythia8		0.10 ± 0.10		_				
	1 lepton, from t > 2 leptons	0.10 ± 0.10		_				
		_	-	_				
	$Z \rightarrow \nu \nu$ Inclusve	25.85 ± 19.05	$-$ 8.04 \pm 7.31	0.41 ± 0.14				
	1 lepton	5.40 ± 1.39	0.73 ± 0.16	0.41 ± 0.14 0.41 ± 0.14				
	1 lepton, from W	5.40 ± 1.39 5.40 ± 1.39	0.73 ± 0.16 0.73 ± 0.16	0.41 ± 0.14 0.41 ± 0.14				
V + Jets	1 lepton, from t	5.40 ± 1.39	0.73 ± 0.16	0.41 ± 0.14				
	> 2 leptons	20.45 ± 19.00	7.31 ± 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	_	_	_				
$DY+Jets \rightarrow \ell\ell$	1 lepton, from t	_	-	_				
	> 2 leptons	20.45 ± 19.00	7.31 ± 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 ± 19.00	7.31 ± 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 ± 19.00	7.31 ± 7.31	_				
	$Z \rightarrow \nu \nu$	20.40 ± 13.00	7.51 ± 7.51	_				
	Inclusve	5.40 ± 1.39	0.73 ± 0.16	0.41 ± 0.14				
	1 lepton	5.40 ± 1.39	0.73 ± 0.16	0.41 ± 0.11 0.41 ± 0.14				
	1 lepton, from W	5.40 ± 1.39	0.73 ± 0.16	0.41 ± 0.11 0.41 ± 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 ± 0.44	_	_				
	1 lepton	0.44 ± 0.44	_	_				
W+Jets $\rightarrow \ell \nu$, 200 < HT < 400, madgraph pythia8	1 lepton, from W	0.44 ± 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 ± 1.25						
	1 lepton	2.10 ± 1.25	_	_				
W+Jets $\rightarrow \ell \nu$, 400 < HT < 600, madgraph pythia8	1 lepton, from W	2.10 ± 1.25	_	_				
** + 5005 - 60, 400 < 111 < 000, maugraph pythias	1 lepton, from t	_	_	_				
	≥ 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$							
·	Inclusve	1.73 ± 0.40	0.06 ± 0.06	0.06 ± 0.06				
	1 lepton	1.73 ± 0.40	0.06 ± 0.06	0.06 ± 0.06				
W+Jets $\rightarrow \ell \nu$, 600 < HT < 800, madgraph pythia8	1 lepton, from W	1.73 ± 0.40	0.06 ± 0.06	0.06 ± 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 ± 0.19	0.59 ± 0.12	0.21 ± 0.07				
	1 lepton	1.13 ± 0.19	0.59 ± 0.12	0.21 ± 0.07				
W+Jets $\rightarrow \ell \nu$, 800 < HT < 1200, madgraph pythia8	1 lepton, from W	1.13 ± 0.19	0.59 ± 0.12	0.21 ± 0.07				
	1 lepton, from t	_	_	_				
	≥ 2 leptons	_	-	_				
	$Z \rightarrow \nu \nu$ Inclusve	_	0.08 ± 0.08	0.14 ± 0.10				
	1 lepton	_	0.08 ± 0.08 0.08 ± 0.08	0.14 ± 0.10 0.14 ± 0.10				
	1 lepton, from W		0.08 ± 0.08 0.08 ± 0.08	0.14 ± 0.10 0.14 ± 0.10				
W+Jets $\rightarrow \ell \nu$, 1200 $< HT < 2500$, madgraph pythia8	1 lepton, from t	_	0.00 ± 0.00	0.14 ± 0.10				
	> 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$	_	<u> </u>	_				
	Inclusve	_		0.00 ± 0.00				
	1 lepton	_	_	0.00 ± 0.00				
W+Jets $\rightarrow \ell \nu$, 2500 < HT < Inf, madgraph pythia8	1 lepton, from W	_	_	0.00 ± 0.00				
$W+Jets \rightarrow \ell \nu$, 2500 $\langle HI \langle Inj, madgraph pytmas \rangle$	1 lepton, from t	_	-	_				
	≥ 2 leptons		_	_				
	$Z \rightarrow \nu \nu$							
	Inclusve	7.09 ± 0.74	2.17 ± 0.39	1.58 ± 0.44				
	1 lepton	0.03 ± 0.04	0.08 ± 0.04	0.02 ± 0.02				
Rare	1 lepton, from W	0.03 ± 0.04	0.08 ± 0.04	0.02 ± 0.02				
	1 lepton, from t	0.00 ± 0.00	0.00 ± 0.00	1.36 ± 0.44				
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	5.31 ± 0.74 1.75 ± 0.04	1.65 ± 0.39 0.45 ± 0.02	0.20 ± 0.44				
	Inclusve	4.26 ± 0.70	1.62 ± 0.37	1.35 ± 0.43				
	1 lepton	0.03 + 0.04	0.08 ± 0.04	0.02 ± 0.02				
	1 lepton, from W	0.03 ± 0.04	0.08 ± 0.04 0.08 ± 0.04	0.02 ± 0.02 0.02 ± 0.02				
diBoson	1 lepton, from t							
	> 2 leptons	3.85 ± 0.70	1.41 ± 0.37	1.24 ± 0.43				
	$Z \rightarrow \nu \nu$	0.37 ± 0.02	0.13 ± 0.01	0.09 ± 0.01				
	Inclusve	2.88 ± 0.67	1.00 ± 0.34	0.76 ± 0.38				
	1 lepton	_	_	_				
WW	1 lepton, from W	_	-	_				
	1 lepton, from t	-	-	-				
	≥ 2 leptons	2.88 ± 0.67	1.00 ± 0.34	0.76 ± 0.38				
	$Z \rightarrow \nu \nu$	-		-				
	Inclusve 1 lepton	2.88 ± 0.67	1.00 ± 0.34	0.76 ± 0.38				
	1 lepton from W	_	-	_				
$WW \rightarrow 2\ell 2\nu$, powheg	1 lepton, from t							
	> 2 leptons	2.88 ± 0.67	1.00 ± 0.34	0.76 ± 0.38				
	$Z \rightarrow \nu \nu$			I				
	Inclusve	_	_	_				
	1 lepton	_	_	_				
WW Auga powbog	1 lepton, from W	_	_	_				
$WW \rightarrow \ell \nu q q$, powheg	1 lepton, from t	_	_	_				
	≥ 2 leptons		_	_				
	$Z \rightarrow \nu \nu$	_	<u> </u>	_				
	Inclusve	0.91 ± 0.21	0.50 ± 0.15	0.45 ± 0.20				
	1 lepton	0.03 ± 0.04	0.08 ± 0.04	0.02 ± 0.02				
WZ	1 lepton, from W	0.03 ± 0.04	0.08 ± 0.04	0.02 ± 0.02				
	1 lepton, from t > 2 leptons	0.88 ± 0.20	0.42 ± 0.15	0.43 ± 0.20				
	$Z \rightarrow \nu \nu$	0.66 £ 0.20	U.42 £ U.13	U.43 I U.20				
	Inclusve	0.78 ± 0.20	0.37 ± 0.15	0.42 ± 0.20				
	1 lepton	0.75 ± 0.20	0.57 ± 0.15	0.42 ± 0.20				
	1 lepton, from W	_	_	_				
$WZ \rightarrow 3\ell\nu$, powheg pythia8	1 lepton, from t	_	_	_				
	≥ 2 leptons	0.78 ± 0.20	0.37 ± 0.15	0.42 ± 0.20				
	$Z \rightarrow \nu \nu$	_	_	_				
			Cor	ntinued 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 jets $modTopness \ge 6.4$ MET > 450				
	Inclusve	0.11 ± 0.03	0.06 ± 0.03	0.01 ± 0.01				
	1 lepton	0.11 ± 0.03	0.00 ± 0.03	0.01 ± 0.01				
	1 lepton, from W	_	_	_				
$WZ\rightarrow 2\ell 2Q$, amenlo pythia8	1 lepton, from t	_	_	_				
	> 2 leptons	0.11 ± 0.03	0.06 ± 0.03	0.01 ± 0.01				
	$Z \rightarrow \nu \nu$							
	Inclusve	0.03 ± 0.04	0.08 ± 0.04	0.02 ± 0.02				
	1 lepton	0.03 ± 0.04	0.08 ± 0.04	0.02 ± 0.02				
W7 4 90 1 41: 0	1 lepton, from W	0.03 ± 0.04	0.08 ± 0.04	0.02 ± 0.02				
$WZ \rightarrow \ell \nu 2Q$, amenlo pythia8	1 lepton, from t	<u> </u>	_	_				
	≥ 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$	_	_	_				
	Inclusve	_	_	_				
	1 lepton	_	_	_				
$WZ \rightarrow 1\ell 3\nu$, amenlo pythia8	1 lepton, from W	_	<u> </u>	_				
W Z→163D, amenio pytinas	1 lepton, from t	-	<u> </u>	-				
	≥ 2 leptons	_	_	_				
	$Z \rightarrow \nu \nu$	_		_				
	Inclusve	0.47 ± 0.04	0.12 ± 0.02	0.14 ± 0.02				
	1 lepton	_	_	_				
ZZ	1 lepton, from W	_	_	_				
	1 lepton, from t							
	≥ 2 leptons	0.09 ± 0.03	-0.01 ± 0.01	0.05 ± 0.02				
	Z o u u	0.37 ± 0.02	0.13 ± 0.01	0.09 ± 0.01				
	Inclusve	0.09 ± 0.03	-0.01 ± 0.01	0.05 ± 0.02				
	1 lepton	_	-	_				
$ZZ\rightarrow 2\ell 2Q$, amcnlo pythia8	1 lepton, from W 1 lepton, from t	_	-	_				
	> 2 leptons	0.09 ± 0.03	-0.01 ± 0.01	0.05 ± 0.02				
	$Z \rightarrow \nu \nu$	0.09 ± 0.03	-0.01 ± 0.01	0.03 ± 0.02				
	Inclusve	0.37 ± 0.02	0.13 ± 0.01	0.09 ± 0.01				
	1 lepton	0.57 ± 0.02	0.15 ± 0.01	0.03 ± 0.01				
	1 lepton, from W	_	_	_				
$ZZ \rightarrow 2\ell 2\nu$, powheg pythia8	1 lepton, from t	_	_	_				
	≥ 2 leptons	_	<u> </u>	_				
	$Z \rightarrow \nu \nu$	0.37 ± 0.02	0.13 ± 0.01	0.09 ± 0.01				
	Inclusve	_	_	_				
	1 lepton	_	_	_				
$ZZ \rightarrow 2Q2\nu$, amcnlo pythia8	1 lepton, from W	_	_	_				
ZZ - ZQZD, amenio pytinao	1 lepton, from t	_	-	_				
	≥ 2 leptons	_	-	_				
	Z ightarrow u u	_	<u> </u>	_				
	Inclusve	2.83 ± 0.23	0.55 ± 0.11	0.22 ± 0.08				
	1 lepton	0.00 ± 0.00	0.00 ± 0.00	_				
$t\bar{t} + V$	1 lepton, from W			_				
•	1 lepton, from t	0.00 ± 0.00	0.00 ± 0.00					
	≥ 2 leptons	1.45 ± 0.23	0.24 ± 0.11	0.11 ± 0.08				
	$Z \rightarrow \nu \nu$	1.37 ± 0.03	0.32 ± 0.01	0.11 ± 0.01				
	Inclusve 1 lepton	1.24 ± 0.23	0.19 ± 0.11	0.09 ± 0.08				
	1 lepton 1 lepton, from W							
$t\bar{t} + W$	1 lepton, from W 1 lepton, from t							
	≥ 2 leptons	1.24 ± 0.23	0.19 ± 0.11	0.09 ± 0.08				
	$Z \rightarrow \nu \nu$	1.24 ± 0.20	0.15 ± 0.11	0.05 ± 0.08				
	Inclusve	1.04 ± 0.22	0.16 ± 0.11	0.03 ± 0.07				
	1 lepton	1 0.22	- 0.11	1 - 0.00				
4 T 1 *** 4	1 lepton, from W	_	_	_				
$t\bar{t} + W \rightarrow \ell\nu$, amenlo pythia8	1 lepton, from t	_	_	_				
	≥ 2 leptons	1.04 ± 0.22	0.16 ± 0.11	0.03 ± 0.07				
	$Z \rightarrow \nu \nu$	_	_	_				
	'	•	Con	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 ± 0.07	0.03 ± 0.02	0.06 ± 0.04			
	1 lepton	0.21 ± 0.01	0.00 ± 0.02	0.00 ± 0.01			
			_	_			
$t\bar{t} + W \rightarrow QQ$, amenlo pythia8			_				
		0.21 ± 0.07	0.03 ± 0.02	0.06 ± 0.04			
		0.21 ± 0.01	0.00 ± 0.02				
		1.59 ± 0.03	0.36 ± 0.01	0.13 ± 0.01			
$tar{t}+Z$		0.00 ± 0.00	0.00 ± 0.00	0.10 ± 0.01			
tt + Z		0.00 ± 0.00	0.00 ± 0.00				
		0.21 ± 0.01	0.04 ± 0.01	0.02 ± 0.00			
		1.37 ± 0.03	0.32 ± 0.01	0.11 ± 0.01			
	Inclusve	1.59 ± 0.03	0.36 ± 0.01	0.13 ± 0.01			
		0.00 ± 0.00	0.00 ± 0.00				
$t\bar{t} + Z$, madgraph	1 lepton, from t	0.00 ± 0.00	0.00 ± 0.00	_			
	> 2 leptons	0.21 ± 0.01	0.04 ± 0.01	0.02 ± 0.00			
	$Z \rightarrow \nu \nu$	1.37 ± 0.03	0.32 ± 0.01	0.11 ± 0.01			
	Inclusve	0.08 ± 0.08	0.00 ± 0.03	0.03 ± 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 ± 0.08	0.00 ± 0.03	0.03 ± 0.02			
	$\begin{array}{c c} 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } t \\ \geq 2 \ \text{leptons} \\ \hline Z \rightarrow \nu\nu \\ \hline \\ Inclusve \\ 1 \ \text{lepton} \\ 1 \ \text{lepton} \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } t \\ \geq 2 \ \text{leptons} \\ \hline Z \rightarrow \nu\nu \\ \hline \\ Inclusve \\ 1 \ \text{lepton} \\ 1 \ \text{lepton} \\ 1 \ \text{lepton} \\ \hline 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } t \\ \geq 2 \ \text{leptons} \\ \hline Z \rightarrow \nu\nu \\ \hline Inclusve \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } t \\ \end{array}$	_	<u> </u>	<u> </u>			
		1.14 ± 0.22	0.28 ± 0.11	0.16 ± 0.06			
	1 lepton	_	<u> </u>	<u> </u>			
$t\bar{t} + Z \rightarrow 2\ell 2\nu$, amenlo pythia8		_	<u> </u>	-			
tt T 2 - 2020, amenio pytinas			<u> </u>	-			
	\geq 2 leptons	0.48 ± 0.14	0.03 ± 0.05	0.03 ± 0.02			
	$Z \rightarrow \nu \nu$	0.66 ± 0.17	0.25 ± 0.10	0.13 ± 0.05			

CR2l, Nominal Systematic, Yield Table for Input Samples

Cl	R21, Nominal Systemat	ic, Yield Table for Inpu			
~ .		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/μ , MET	Inclusve	135.00 ± 11.62	48.00 ± 6.93	18.00 ± 4.24	6.00 ± 2.45
	7 ,				
	Inclusve	169.43 ± 7.08	40.51 ± 2.46	12.83 ± 4.17	5.22 ± 0.98
	1 lepton	12.38 ± 1.53	3.26 ± 1.07	0.81 ± 0.20	0.70 ± 0.32
All Background	1 lepton, from W	3.39 ± 0.57	2.02 ± 0.99	0.48 ± 0.15	0.46 ± 0.29
ű.	1 lepton, from t	8.99 ± 1.42	1.24 ± 0.41	0.33 ± 0.14	0.23 ± 0.15
	≥ 2 leptons	155.55 ± 6.91	36.70 ± 2.21	11.89 ± 4.17	4.44 ± 0.93
	$Z \rightarrow \nu \nu$	1.50 ± 0.03	0.55 ± 0.06	0.12 ± 0.01	0.08 ± 0.04
	Inclusve	140.51 ± 3.46	31.23 ± 1.49	6.61 ± 0.63	2.55 ± 0.38
	1 lepton	8.96 ± 1.42	1.23 ± 0.41	0.33 ± 0.14	0.23 ± 0.15
$tar{t}$	1 lepton, from W	-	<u> </u>		_
	1 lepton, from t	8.96 ± 1.42	1.23 ± 0.41	0.33 ± 0.14	0.23 ± 0.15
	≥ 2 leptons	131.55 ± 3.15	30.00 ± 1.43	6.28 ± 0.61	2.31 ± 0.34
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	4.59 ± 1.28	0.48 ± 0.34	_	0.14 ± 0.14
	1 lepton	4.59 ± 1.28	0.48 ± 0.34	_	0.14 ± 0.14
$t\bar{t}$, single lepFromT, madgraph pythia8	1 lepton, from W	_	_	_	_
ii, singie ieprromii, madgraph pythiao	1 lepton, from t	4.59 ± 1.28	0.48 ± 0.34	_	0.14 ± 0.14
	≥ 2 leptons	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	4.37 ± 0.62	0.75 ± 0.22	0.33 ± 0.14	0.09 ± 0.07
	1 lepton	4.37 ± 0.62	0.75 ± 0.22	0.33 ± 0.14	0.09 ± 0.07
	1 lepton, from W				
$tar{t}$, single lep FromTbar, madgraph pythia 8, ext1	1 lepton, from t	4.37 ± 0.62	0.75 ± 0.22	0.33 ± 0.14	0.09 ± 0.07
	> 2 leptons	=			
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	131.55 ± 3.15	30.00 ± 1.43	6.28 ± 0.61	2.31 ± 0.34
	1 lepton		1		
	1 lepton, from W	_	_	_	_
$t\bar{t}$, diLepton, madgraph pythia8, ext1	1 lepton, from t	_	_	_	_
	> 2 leptons	131.55 ± 3.15	30.00 ± 1.43	6.28 ± 0.61	2.31 ± 0.34
	$Z \rightarrow \nu \nu$				
	Inclusve	12.42 ± 2.92	5.48 ± 1.89	0.48 ± 0.48	1.38 ± 0.80
	1 lepton		0.97 ± 0.97		
	1 lepton, from W	_	0.97 ± 0.97	_	_
single t	1 lepton, from t	_		_	_
	> 2 leptons	12.42 ± 2.92	4.50 ± 1.62	0.48 ± 0.48	1.38 ± 0.80
	$Z \rightarrow \nu \nu$		1		
	Inclusve	12.42 ± 2.92	5.48 ± 1.89	0.48 ± 0.48	1.38 ± 0.80
	1 lepton		0.97 ± 0.97		
	1 lepton, from W	_	0.97 ± 0.97	_	_
single $t t - W$ -channel	1 lepton, from t	_	1 5.57 ± 5.57	_	_
	≥ 2 leptons	12.42 ± 2.92	4.50 ± 1.62	0.48 ± 0.48	1.38 ± 0.80
	$Z \rightarrow \nu \nu$		I		
	Inclusve		<u> </u>	_	
	1 lepton	_	_	_	_
	1 lepton, from W	_	_	_	_
single $t, t - W$ -channel, powheg pythia8	1 lepton, from t	_	_	_	_
		_	_	_	_
	> 2 leptons			I .	
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	_	_	_	_
	$Z \rightarrow \nu \nu$	$-$ 12.42 \pm 2.92	5.48 ± 1.89	$-$ 0.48 \pm 0.48	1.38 ± 0.80
	$Z \rightarrow \nu \nu$ Inclusve	12.42 ± 2.92	5.48 ± 1.89 0.97 ± 0.97	0.48 ± 0.48	1.38 ± 0.80
	$Z \rightarrow \nu \nu$ Inclusve 1 lepton	12.42 ± 2.92	0.97 ± 0.97	0.48 ± 0.48	1.38 ± 0.80
single $\bar{t},\ t-W$ -channel, powheg pythia8	Z o u u Inclusve 1 lepton 1 lepton, from W	12.42 ± 2.92		0.48 ± 0.48	1.38 ± 0.80 —
single $\bar{t},\ t-W$ -channel, powheg pythia8	$Z \rightarrow \nu \nu$ Inclusve 1 lepton 1 lepton, from W 1 lepton, from t	_ _ _	$\begin{array}{c} 0.97 \pm 0.97 \\ 0.97 \pm 0.97 \\ \end{array}$	_ _ _	_ _ _
single $ar{t},\ t-W$ -channel, powheg pythia8	$Z \rightarrow \nu \nu$ Inclusve 1 lepton 1 lepton, from W 1 lepton, from t ≥ 2 leptons	12.42 ± 2.92 	0.97 ± 0.97	0.48 ± 0.48 ————————————————————————————————————	$ \begin{array}{c} $
single $ar{t},\ t-W$ -channel, powheg pythia8	$Z \rightarrow \nu \nu$ Inclusve 1 lepton 1 lepton, from W 1 lepton, from t ≥ 2 leptons $Z \rightarrow \nu \nu$	_ _ _	$\begin{array}{c} 0.97 \pm 0.97 \\ 0.97 \pm 0.97 \\ \end{array}$	_ _ _	_ _ _
single $\bar{t},\ t-W$ -channel, powheg pythia8		_ _ _	$\begin{array}{c} 0.97 \pm 0.97 \\ 0.97 \pm 0.97 \\ \end{array}$	_ _ _	_ _ _
	$Z ightarrow u V$ Inclusve 1 lepton, from W 1 lepton, from t \geq 2 leptons $Z ightarrow u V$ Inclusve 1 lepton	_ _ _	$\begin{array}{c} 0.97 \pm 0.97 \\ 0.97 \pm 0.97 \\ \end{array}$	0.48 ± 0.48	_ _ _
single $ar{t},\ t-W$ -channel, powheg pythia 8 $\label{eq:total_single} \text{single } t \text{ non } t-W\text{-channel}$	$Z \rightarrow \nu \nu$ Inclusve 1 lepton 1 lepton, from W 1 leptons, T $\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$ Inclusve 1 lepton 1 lepton, from W	_ _ _	$\begin{array}{c} 0.97 \pm 0.97 \\ 0.97 \pm 0.97 \\ \end{array}$	0.48 ± 0.48	_ _ _
		_ _ _	$\begin{array}{c} 0.97 \pm 0.97 \\ 0.97 \pm 0.97 \\ \end{array}$	0.48 ± 0.48	_ _ _
	$Z \rightarrow \nu \nu$ Inclusve 1 lepton 1 lepton, from W 1 leptons, T $\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$ Inclusve 1 lepton 1 lepton, from W	_ _ _	$\begin{array}{c} 0.97 \pm 0.97 \\ 0.97 \pm 0.97 \\ \end{array}$	0.48 ± 0.48	_ _ _

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 ± 5.39	1.01 ± 0.19	4.54 ± 4.08	0.46 ± 0.29					
	1 lepton	3.27 ± 0.57	1.01 ± 0.19	0.47 ± 0.15	0.46 ± 0.29					
	1 lepton, from W	3.27 ± 0.57	1.01 ± 0.19	0.47 ± 0.15	0.46 ± 0.29					
$V + \mathrm{Jets}$	1 lepton, from t									
	> 2 leptons	5.36 ± 5.36		4.07 ± 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 ± 4.07	_					
	1 lepton	_	_	_	_					
$DY+Jets \rightarrow \ell\ell$	1 lepton, from W	_	_	_	_					
	1 lepton, from t	l 	_	I 	_					
	≥ 2 leptons	5.36 ± 5.36	_	4.07 ± 4.07	_					
	$Z \rightarrow \nu \nu$									
	Inclusve	_		_						
	1 lepton	_	_	_	_					
D351.7	1 lepton, from W	_	_	_	_					
DY+Jets $\rightarrow \ell\ell$, M10to50, amc nlo pythia8	1 lepton, from t	_	_	_	_					
	> 2 leptons	_	_	_	_					
	$Z \rightarrow \nu \nu$	_	_	_	_					
	Inclusve	5.36 ± 5.36		4.07 ± 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		_	-	_					
	\geq 2 leptons	5.36 ± 5.36	_	4.07 ± 4.07	_					
	$Z \rightarrow \nu \nu$	_	_		_					
	Inclusve	3.27 ± 0.57	1.01 ± 0.19	0.47 ± 0.15	0.46 ± 0.29					
	1 lepton	3.27 ± 0.57	1.01 ± 0.19	0.47 ± 0.15	0.46 ± 0.29					
777.1.7	1 lepton, from W	3.27 ± 0.57	1.01 ± 0.19	0.47 ± 0.15	0.46 ± 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	_	_	_	_					
	≥ 2 leptons	_	_	_	_					
		_	_	_	_					
	$Z \rightarrow \nu \nu$			_						
	Inclusve	1.23 ± 0.36	0.14 ± 0.10	_	0.04 ± 0.04					
	1 lepton	1.23 ± 0.36	0.14 ± 0.10	_	0.04 ± 0.04					
W+Jets $\rightarrow \ell \nu$, 600 < HT < 800, madgraph pythia8	1 lepton, from W	1.23 ± 0.36	0.14 ± 0.10	_	0.04 ± 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	$MT2W \ge 200$	MT2W≥200	MT2W≥200	$MT2W \ge 200$			
		250 < MET < 350	350 < MET < 450	450 < MET < 550	MET > 550			
	Inclusve	1.58 ± 0.23	0.87 ± 0.16	0.31 ± 0.10	0.05 ± 0.02			
	1 lepton	1.58 ± 0.23	0.87 ± 0.16	0.31 ± 0.10	0.05 ± 0.02			
	1 lepton, from W	1.58 ± 0.23	0.87 ± 0.16	0.31 ± 0.10	0.05 ± 0.02			
W+Jets $\rightarrow \ell \nu$, 800 $< HT < 1200$, madgraph pythia8	1 lepton, from t	1.00 ± 0.20	0.07 ± 0.10	0.51 ± 0.10	0.00 ± 0.02			
	> 2 leptons		_		_			
	$Z \rightarrow \nu \nu$		_	_	_			
	Inclusve	0.46 ± 0.37		0.15 ± 0.11	0.34 ± 0.28			
			_					
	1 lepton	0.46 ± 0.37	_	0.15 ± 0.11	0.34 ± 0.28			
W+Jets $\rightarrow \ell \nu$, 1200 < HT < 2500, madgraph pythia8	1 lepton, from W	0.46 ± 0.37	_	0.15 ± 0.11	0.34 ± 0.28			
, , , , , , , , , , , , , , , , , , , ,	1 lepton, from t	_	_	_	_			
	≥ 2 leptons	_	_	_	_			
	$Z \rightarrow \nu \nu$		_					
	Inclusve	_	_	_	0.04 ± 0.02			
	1 lepton	_	_	_	0.04 ± 0.02			
W+Jets $\rightarrow \ell \nu$, 2500 < HT < Inf, madgraph pythia8	1 lepton, from W	_	_	_	0.04 ± 0.02			
W+3cts > cv, 2000 < 111 < 1nj, madgraphi pytmao	1 lepton, from t	_	_	_	_			
	\geq 2 leptons	_	_	_	_			
	$Z \rightarrow \nu \nu$							
	Inclusve	7.87 ± 0.81	2.80 ± 0.46	1.19 ± 0.40	0.83 ± 0.33			
	1 lepton	0.15 ± 0.06	0.05 ± 0.03	0.02 ± 0.02	_			
Rare	1 lepton, from W	0.12 ± 0.06	0.04 ± 0.03	0.02 ± 0.02	_			
	1 lepton, from t	0.03 ± 0.01	0.01 ± 0.00	0.00 ± 0.00	_			
	> 2 leptons	6.23 ± 0.80	2.19 ± 0.46	1.05 ± 0.40	0.75 ± 0.33			
	$Z \rightarrow \nu \nu$	1.50 ± 0.03	0.55 ± 0.06	0.12 ± 0.01	0.08 ± 0.04			
	Inclusve	4.16 ± 0.74	1.77 ± 0.43	0.96 ± 0.39	0.70 ± 0.33			
	1 lepton	0.12 ± 0.06	0.04 ± 0.03	0.02 ± 0.02	0.10 ± 0.00			
	1 lepton, from W	0.12 ± 0.06 0.12 ± 0.06	0.04 ± 0.03	0.02 ± 0.02 0.02 ± 0.02	_			
diBoson	1 lepton, from t	0.12 ± 0.00	0.04 ± 0.03	0.02 ± 0.02				
	> 2 leptons	3.84 ± 0.74	1.58 ± 0.43	0.91 ± 0.39	0.65 ± 0.32			
	$Z \rightarrow \nu \nu$	0.21 ± 0.02	0.15 ± 0.06	0.91 ± 0.09 0.03 ± 0.01	0.05 ± 0.32 0.06 ± 0.04			
	Inclusve	2.64 ± 0.69	1.16 ± 0.40	0.82 ± 0.39	0.49 ± 0.31			
	1 lepton	_	_	_	_			
WW	1 lepton, from W	_	_	_	_			
	1 lepton, from t							
	≥ 2 leptons	2.64 ± 0.69	1.16 ± 0.40	0.82 ± 0.39	0.49 ± 0.31			
	$Z \rightarrow \nu \nu$		_					
	Inclusve	2.64 ± 0.69	1.16 ± 0.40	0.82 ± 0.39	0.49 ± 0.31			
	1 lepton	_	_	_	_			
$WW \rightarrow 2\ell 2\nu$, powheg	1 lepton, from W	_	_	_	_			
powneg	1 lepton, from t	-	_	_	_			
	≥ 2 leptons	2.64 ± 0.69	1.16 ± 0.40	0.82 ± 0.39	0.49 ± 0.31			
	$Z \rightarrow \nu \nu$		_		_			
	Inclusve	-	_	_	_			
	1 lepton	_	_	_	_			
WW Muga powbog	1 lepton, from W	_	_	_	_			
$WW \rightarrow \ell \nu qq$, powheg	1 lepton, from t	_	_	_	_			
	> 2 leptons	_	_	_	_			
	$Z \rightarrow \nu \nu$	_	l —	_	_			
	Inclusve	1.25 ± 0.26	0.50 ± 0.15	0.11 ± 0.05	0.19 ± 0.09			
	1 lepton	0.12 ± 0.06	0.04 ± 0.03	0.02 ± 0.02				
	1 lepton, from W	0.12 ± 0.06	0.04 ± 0.03	0.02 ± 0.02	_			
WZ	1 lepton, from t		I	1 0.02 ± 0.02	_			
	> 2 leptons	1.13 ± 0.25	0.40 ± 0.14	0.09 ± 0.05	0.15 ± 0.08			
	$Z \rightarrow \nu \nu$	1.13 ± 0.23	0.40 ± 0.14 0.05 ± 0.05	0.09 ± 0.03	0.13 ± 0.08 0.04 ± 0.04			
		1.06 ± 0.25		0.07 + 0.05				
	Inclusve	1.06 ± 0.25	0.38 ± 0.14	0.07 ± 0.05	0.14 ± 0.08			
	1 lepton	_	_	_	_			
$WZ \rightarrow 3\ell\nu$, powheg pythia8	1 lepton, from W	_	_	_	_			
,	1 lepton, from t							
	≥ 2 leptons	1.06 ± 0.25	0.38 ± 0.14	0.07 ± 0.05	0.14 ± 0.08			
	$Z \rightarrow \nu \nu$	_		_	_			
					d on next page			

Table 10 - continued from previous page

Sample Classification $200 \times MT2W \ge 00$ $MT2W \ge 00$		lable 10 - conti	nued from previous p			
Incluses 1 lepton			3jets	3jets	3jets	3jets
$WZ \rightarrow 2\ell 2Q, \text{ amenlo pythia8} \qquad \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Sample	Classification				$MT2W \ge 200$
$WZ - 2\ell 2Q, \text{ amenlo pythia8} \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$			250 < MET < 350	350 < MET < 450	450 < MET < 550	MET > 550
$WZ - 2\ell 2Q, \text{ amenlo pythia8} \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$		Inclusve	0.07 ± 0.05	0.02 ± 0.02	0.02 ± 0.01	0.01 ± 0.01
			- 0.00 ± 0.00	0.02 ± 0.02	0.02 ± 0.01	- 0.01
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						_
	$WZ\rightarrow 2\ell 2Q$, amcnlo pythia8					_
			0.07 ± 0.05	0.02 ± 0.02	0.02 ± 0.01	0.01 ± 0.01
				0.02 ± 0.02	0.02 ± 0.01	0.01 ± 0.01
				0.04 0.08	0.00 0.00	
						_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$WZ \rightarrow \ell \nu 2Q$, amenlo pythia8		0.12 ± 0.06	0.04 ± 0.03	0.02 ± 0.02	_
	**		_	_	_	_
$ Incluse 1 lepton - 0.05 \pm 0.05 - 0.04 \pm 0.6 1 lepton - - - - - - - - - $			_	_	_	_
			_			
			_	0.05 ± 0.05	_	0.04 ± 0.04
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	WZ-1/34 amenlo pythia8		_	_	_	_
	W 2 - 1cov, amenio pytinao		_	_	_	_
$ZZ = \frac{1 \text{ lichusv}}{2 2 \text{ lipton}} = \frac{1 \text{ lichus}}{1 \text{ lipton, from } W} = \frac{1}{1} - 1$			-	_	_	_
$ ZZ = \begin{cases} 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{leptons} \\ 2 & \text{leptons} \\ 2 & \text{leptons} \\ 2 & \text{leptons} \\ 2 & \text{lepton} \\ 2 & \text{lepton} \\ 2 & \text{leptons} \\ 2 & \text{lepton} \\ 2 & \text{lepton} \\ 2 & \text{lepton} \\ 2 & \text{lepton} \\ 2 & \text{lepton} \\ 2 & \text{lepton} \\ 2 & \text{lepton} \\ 2 & \text{lepton, from } W \\ 1 & \text{lepton, from } W \\ 1 & \text{lepton, from } W \\ 1 & \text{lepton, from } W \\ 2 & \text{lepton, from } W $		$Z \rightarrow \nu \nu$	_	0.05 ± 0.05	-	0.04 ± 0.04
$ ZZ = \begin{cases} 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{leptons} \\ 2 & \text{leptons} \\ 2 & \text{leptons} \\ 2 & \text{leptons} \\ 2 & \text{lepton} \\ 2 & lept$		Inclusve	0.27 ± 0.04	0.11 ± 0.02	0.04 ± 0.01	0.02 ± 0.01
$ ZZ = \begin{cases} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \end{cases} = \begin{cases} 0.07 \pm 0.04 \\ 0.01 \pm 0.02 \\ 0.10 \pm 0.01 \\ 0.03 \pm 0.01 \\ 0.01 \pm 0.01 \\ 0.03 \pm 0.01 \\ 0.02 \pm 0.01 \\ 0.01 \pm 0.01 \\ 0.03 \pm 0.01 \\ 0.02 \pm 0.01 \\ 0.01 \pm 0.01 \\ 0.02 \pm 0.01 \\ 0.01 \pm 0.01 \\ 0.02 \pm 0.01 \\ 0.01 \pm 0.01 \\ 0.02 \pm 0.01 \\ 0.01 \pm 0.01 \\ 0.02 \pm 0.01 \\ 0.01 \pm 0.01 \\ 0.02 \pm 0.01 \\ 0.01 \pm 0.01 \\ 0.00 \pm 0.01 \\ 0.02 \pm 0.01 \\ 0.01 \pm 0.01 \\ 0.00 \pm 0.01 \\ 0.02 \pm 0.01 \\ 0.01 \pm 0.01 \\ 0.03 \pm 0.01 \\ 0.00 \pm 0$		1 lepton	_	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	77		_	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	ZZ		_	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			0.07 ± 0.04	0.01 ± 0.02	0.01 ± 0.01	0.00 ± 0.01
$ZZ \rightarrow 2\ell 2Q, \text{ amenlo pythia8} \\ \begin{array}{c} & \text{Incluser} \\ 1 \text{ lepton, } \\ 1 \text{ lepton, } \\ Z \neq \nu \\ \\ Z \neq \nu \\ \\ Z = \nu $						0.02 ± 0.01
$ZZ \rightarrow 2\ell 2Q, \text{ amenlo pythia8} \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			0.01 ± 0.01	0.01 ± 0.02	0.01 ± 0.01	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ZZ\rightarrow 2\ell 2Q$, amcnlo pythia8					
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	EV		0.07 ± 0.04	0.01 ± 0.02	0.01 ± 0.01	0.00 ± 0.01
$ZZ \rightarrow 2\ell 2\nu \text{, powheg pythia8} \qquad \begin{array}{ c c c c c c }\hline & & & & & & & & & & & & & & & & & & &$			0.07 ± 0.04	0.01 ± 0.02	0.01 ± 0.01	0.00 ± 0.01
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			0.21 ± 0.02	0.10 ± 0.01	0.02 ± 0.01	0.02 ± 0.01
$ ZZ \to 2\ell 2\nu \text{, powheg pythia8} \\ \begin{array}{c} 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \to \nu \nu \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } t \\ - \\ 1 \text{ lepton, from } t \\ - \\ 2 \text{ leptons, from } t \\ - \\ 2 \text{ lepton, from } t \\ - \\ 2 \text{ leptons} \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } t \\ - \\ 2 \text{ lepton, from } t \\ - \\ 2 \text{ lepton, from } t \\ - \\ 2 \text{ leptons} \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } t \\ - \\ 2 \text{ leptons} \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } t \\ - \\ 2 \text{ leptons} \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } t \\ - \\ 2 \text{ leptons} \\ \end{array} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\$			0.21 ± 0.02	0.10 ± 0.01	0.03 ± 0.01	0.02 ± 0.01
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_		_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ZZ\rightarrow 2\ell 2\nu$, powheg pythia8		_	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_	_
$ ZZ \rightarrow 2Q2\nu, \text{ amenlo pythia8} \\ \begin{array}{c} \text{Inclusve} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \\ t\bar{t} + V \\ \end{array} \\ \begin{array}{c} \text{Inclusve} \\ 1 \text{ lepton, from } W \\ 1 l$						0.00 0.01
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			0.21 ± 0.02	0.10 ± 0.01	0.03 ± 0.01	0.02 ± 0.01
$ 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 \\ \\ t\bar{t} + V \\ \\ t\bar{t} + W $			-	_	_	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	-	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ZZ \rightarrow 2Q2\nu$, amenlo pythia8		_	_	_	-
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	· ,		_	_	_	_
$t\bar{t} + V \qquad \begin{array}{c} \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } V \\ 1 \text{ lepton, from } V \\ 2 \text{ lepton, from } V \\ 1 \text{ lepton, from } V \\ 2 \text{ lepton, from } V \\ 1 \text{ lepton, from } V \\ 2 \text{ lepton, from } V \\ 2 \text{ lepton, from } V \\ 2 \text{ lepton, from } V \\ 2 \text{ lepton, from } V \\ 2 \text{ lepton, from } V \\ 2 \text{ lepton, from } V \\ 2 \text{ lepton, from } V \\ 2 \text{ lepton, from } V \\ 2 \text{ lepton, from } V \\ 2 \text{ lepton, from } V \\ 2 \text{ lepton, from } V \\ 1 \text{ lepton, from } V \\ 1 \text{ lepton, from } V \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } V \\ 1 \text{ lepton, from } V \\ 1 \text{ lepton, from } W \\ 1 l$			_	_	_	_
$t\bar{t} + V = \begin{pmatrix} 1 & lepton & 0.03 \pm 0.01 & 0.01 \pm 0.00 & 0.00 \pm 0.00 & - \\ 1 & lepton, from W & 0.03 \pm 0.01 & 0.01 \pm 0.00 & 0.00 \pm 0.00 & - \\ 1 & lepton, from t & 0.03 \pm 0.01 & 0.01 \pm 0.00 & 0.00 \pm 0.00 & - \\ 2 & leptons & 2.39 \pm 0.32 & 0.62 \pm 0.17 & 0.14 \pm 0.07 & 0.10 \pm 0.0 \\ Z \rightarrow \nu \nu & 1.29 \pm 0.03 & 0.40 \pm 0.02 & 0.09 \pm 0.01 & 0.03 \pm 0.0 \\ 1 & lepton & 0.01 \pm 0.01 & - & - & - & - \\ 1 & lepton, from W & - & - & - & - & - \\ 1 & lepton, from t & 0.01 \pm 0.01 & - & - & - & - \\ 2 & leptons & 1.78 \pm 0.31 & 0.48 \pm 0.17 & 0.10 \pm 0.07 & 0.09 \pm 0.0 \\ 2 & leptons & 1.78 \pm 0.31 & 0.48 \pm 0.17 & 0.10 \pm 0.07 & 0.09 \pm 0.0 \\ 2 & leptons & 1.78 \pm 0.31 & 0.48 \pm 0.17 & 0.10 \pm 0.07 & 0.09 \pm 0.0 \\ 2 & lepton & 1.42 \pm 0.30 & 0.45 \pm 0.17 & 0.02 \pm 0.06 & 0.10 \pm 0.0 \\ 1 & lepton, from W & - & - & - & - & - \\ 1 & lepton, from W & - & - & - & - & - \\ 1 & lepton, from t & - & - & - & - & - \\ 2 & leptons & 1.42 \pm 0.30 & 0.45 \pm 0.17 & 0.02 \pm 0.06 & 0.10 \pm 0.0 \\ 2 & lepton & 1.42 \pm 0.30 & 0.45 \pm 0.17 & 0.02 \pm 0.06 & 0.10 \pm 0.0 \\ 2 & lepton & 1.42 \pm 0.30 & 0.45 \pm 0.17 & 0.02 \pm 0.06 & 0.10 \pm 0.0 \\ 2 & lepton & 1.42 \pm 0.30 & 0.45 \pm 0.17 & 0.02 \pm 0.06 & 0.10 \pm 0.0 \\ 2 & leptons & 1.42 \pm 0.30 & 0.45 \pm 0.17 & 0.02 \pm 0.06 & 0.10 \pm 0.0 \\ 2 & leptons & 1.42 \pm 0.30 & 0.45 \pm 0.17 & 0.02 \pm 0.06 & 0.10 \pm 0.0 \\ 2 & leptons & 1.42 \pm 0.30 & 0.45 \pm 0.17 & 0.02 \pm 0.06 & 0.10 \pm 0.0 \\ 2 & leptons & 1.42 \pm 0.30 & 0.45 \pm 0.17 & 0.02 \pm 0.06 & 0.10 \pm 0.0 \\ 2 & leptons & 1.42 \pm 0.30 & 0.45 \pm 0.17 & 0.02 \pm 0.06 & 0.10 \pm 0.0 \\ 2 & leptons & 1.42 \pm 0.30 & 0.45 \pm 0.17 & 0.02 \pm 0.06 & 0.10 \pm 0.0 \\ 2 & leptons & 1.42 \pm 0.30 & 0.45 \pm 0.17 & 0.02 \pm 0.06 & 0.10 \pm 0.0 \\ 2 & leptons & 1.42 \pm 0.30 & 0.45 \pm 0.17 & 0.02 \pm 0.06 & 0.10 \pm 0.0 \\ 2 & lepton & 1.42 \pm 0.30 & 0.45 \pm 0.17 & 0.02 \pm 0.06 & 0.10 \pm 0.0 \\ 2 & lepton & 1.42 \pm 0.30 & 0.45 \pm 0.17 & 0.02 \pm 0.06 & 0.10 \pm 0.0 \\ 2 & lepton & 1.42 \pm 0.30 & 0.45 \pm 0.17 & 0.02 \pm 0.06 & 0.10 \pm 0.0 \\ 2 & lepton & 1.42 \pm 0.30 & 0.45 \pm 0.17 & 0.02 \pm 0.06 & 0.10 \pm 0.0 \\ 2 & lepton & 1.42 \pm 0.30 & 0.45 \pm 0.17 & 0.02 \pm 0.06 & 0.10$			_	_	_	
$t\bar{t} + V \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ 1 \text{ lepton, from } t \\ 1 \text{ lepton, from } t \\ 1 \text{ lepton, from } t \\ 1 \text{ lepton, from } W \\ 1 lep$						0.13 ± 0.04
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			0.03 ± 0.01	0.01 ± 0.00	0.00 ± 0.00	-
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$t\bar{t} \perp V$		-	_	_	l —
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	CC T V					_
$t\bar{t} + W \rightarrow \ell\nu \text{, amenlo pythia8} \begin{array}{c ccccccccccccccccccccccccccccccccccc$		≥ 2 leptons	2.39 ± 0.32	0.62 ± 0.17	0.14 ± 0.07	0.10 ± 0.04
$t\bar{t} + W \rightarrow \ell\nu \text{, amenlo pythia8} \begin{array}{c ccccccccccccccccccccccccccccccccccc$		$Z \rightarrow \nu \nu$	1.29 ± 0.03	0.40 ± 0.02	0.09 ± 0.01	0.03 ± 0.00
$t\bar{t} + W \qquad \begin{array}{ccccccccccccccccccccccccccccccccccc$		Inclusve		0.48 ± 0.17		0.09 ± 0.04
$t\bar{t} + W \\ & 1 \text{ lepton, from } W \\ & 1 \text{ lepton, from } t \\ & \geq 2 \text{ leptons} \\ Z \to \nu \nu \\ & 1 \text{ lepton, from } t \\ Z \to \nu \nu \\ & 1 \text{ lepton}, \\ & 1 \text{ lepton} t \\ & 1 \text{ lepton} \\ & 1 \text{ lepton} \\ & 1 \text{ lepton}, \\ & 1 \text{ lepton, from } W \\ & - \\ & 1 \text{ lepton, from } W \\ & - \\ & 1 \text{ lepton, from } t \\ & \geq 2 \text{ leptons} \\ & 1 \text{ lepton, from } t \\ & -$		1 lepton		_	_	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			<u> </u>	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	tt + W		0.01 ± 0.01	_	_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				0.48 ± 0.17	0.10 ± 0.07	0.09 ± 0.04
Inclusve 1.42 \pm 0.30 0.45 \pm 0.17 0.02 \pm 0.06 0.10 \pm 0.0 til epton, from W 1 lepton, from W 1 lepton, from t \geq 2 leptons Z $\rightarrow \nu \nu$ 0.45 \pm 0.17 0.02 \pm 0.06 0.10 \pm 0.0 til epton, from t \geq 1.42 \pm 0.30 0.45 \pm 0.17 0.02 \pm 0.06 0.10 \pm 0.0 til epton, from t \geq 1.42 \pm 0.30 0.45 \pm 0.17 0.02 \pm 0.00 0.10 \pm 0.00 \pm 0.10 \pm 0.00 \pm 0.10				I ******	1	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$			1.42 ± 0.30	0.45 ± 0.17	0.02 ± 0.06	0.10 ± 0.04
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			1.42 ± 0.30	0.45 ± 0.17	0.02 ± 0.00	0.10 ± 0.04
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$t\bar{t} + W \rightarrow \ell\nu$, amenlo pythia8					
Z ightarrow u u u u u u u u u u u u u			1 42 ± 0 30	0.45 ± 0.17	0.02 ± 0.06	0.10 ± 0.04
					0.02 ± 0.00	0.10 ± 0.04
		$Z \rightarrow \nu \bar{\nu}$	_	_		

Table 10 - continued from previous page

	Table 10 – cont	inued from previous p	age		
		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 ± 0.09	0.03 ± 0.05	0.07 ± 0.03	-0.01 ± 0.01
	1 lepton	0.01 ± 0.01			
	1 lepton, from W		_	_	_
$t\bar{t} + W \rightarrow QQ$, amcnlo pythia8	1 lepton, from t	0.01 ± 0.01	_	_	_
	> 2 leptons	0.35 ± 0.09	0.03 ± 0.05	0.07 ± 0.03	-0.01 ± 0.01
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	1.92 ± 0.04	0.54 ± 0.02	0.14 ± 0.01	0.04 ± 0.00
	1 lepton	0.02 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	_
$t\bar{t} + Z$	1 lepton, from W	_	_	_	<u> </u>
tt + 2	1 lepton, from t	0.02 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	_
	≥ 2 leptons	0.61 ± 0.02	0.13 ± 0.01	0.04 ± 0.01	0.01 ± 0.00
	$Z \rightarrow \nu \nu$	1.29 ± 0.03	0.40 ± 0.02	0.09 ± 0.01	0.03 ± 0.00
	Inclusve	1.92 ± 0.04	0.54 ± 0.02	0.14 ± 0.01	0.04 ± 0.00
	1 lepton	0.02 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	_
$t\bar{t} + Z$, madgraph	1 lepton, from W	_	_	_	_
tt + 2, madgraph	1 lepton, from t	0.02 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	_
	≥ 2 leptons	0.61 ± 0.02	0.13 ± 0.01	0.04 ± 0.01	0.01 ± 0.00
	$Z \rightarrow \nu \nu$	1.29 ± 0.03	0.40 ± 0.02	0.09 ± 0.01	0.03 ± 0.00
	Inclusve	0.45 ± 0.13	0.07 ± 0.05	0.08 ± 0.04	_
	1 lepton	_	_	_	_
$t\bar{t} + Z \rightarrow QQ$, amenlo pythia8	1 lepton, from W	_	_	_	_
to 2 · QQ, ameno pythiae	1 lepton, from t	_	_	_	_
	≥ 2 leptons	0.45 ± 0.13	0.07 ± 0.05	0.08 ± 0.04	_
	$Z \rightarrow \nu \nu$	_	_	_	_
	Inclusve	2.18 ± 0.31	0.55 ± 0.17	0.09 ± 0.07	0.13 ± 0.06
	1 lepton	_	_	_	_
$t\bar{t} + Z \rightarrow 2\ell 2\nu$, amenlo pythia8	1 lepton, from W	_	_	_	_
F, 41100	1 lepton, from t	I 	I —		l .
	≥ 2 leptons	1.08 ± 0.21	0.12 ± 0.08	-0.00 ± 0.04	0.06 ± 0.03
	$Z \rightarrow \nu \nu$	1.09 ± 0.23	0.42 ± 0.14	0.09 ± 0.06	0.07 ± 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/μ , MET	Inclusve	399.00 ± 19.97	91.00 ± 9.54	22.00 ± 4.69
All Background	Inclusve 1 lepton 1 lepton, from W 1 lepton, from t \geq 2 leptons $Z \rightarrow \nu \nu$	$\begin{array}{c} 594.79 \pm 6.97 \\ 17.80 \pm 1.88 \\ 2.48 \pm 0.83 \\ 15.32 \pm 1.69 \\ 574.65 \pm 6.71 \\ 2.33 \pm 0.04 \end{array}$	$\begin{array}{c} 109.09 \pm 2.82 \\ 4.54 \pm 0.92 \\ 0.48 \pm 0.18 \\ 4.06 \pm 0.90 \\ 104.09 \pm 2.67 \\ 0.45 \pm 0.02 \end{array}$	31.99 ± 1.40 1.71 ± 0.44 0.12 ± 0.07 1.60 ± 0.44 30.17 ± 1.33 0.11 ± 0.01
$tar{t}$	Inclusve 1 lepton 1 lepton, from W 1 lepton, from $t \ge 2$ leptons $Z \to \nu\nu$		$ \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 ± 1.50 7.59 ± 1.50 $ 7.59 \pm 1.50$ $ -$	2.16 ± 0.83 2.16 ± 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 pythia8, ext1	Inclusve 1 lepton 1 lepton, from W 1 lepton, from t \geq 2 leptons $Z \rightarrow \nu \nu$		$ \begin{array}{r} 1.84 \pm 0.35 \\ 1.84 \pm 0.35 \\ $	$\begin{array}{c} 0.90 \pm 0.25 \\ 0.90 \pm 0.25 \\$
$t\bar{t},$ di Lepton, madgraph pythia 8, ext 1	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 ± 0.55	0.41 ± 0.41 — — 0.41 ± 0.41
single t t — W -channel	Inclusve 1 lepton 1 lepton, from W 1 lepton, from t ≥ 2 leptons $Z \rightarrow \nu \nu$	$\begin{array}{c} 7.18 \pm 2.12 \\ 0.62 \pm 0.62 \\ 0.62 \pm 0.62 \\ \hline \\ -6.56 \pm 2.03 \\ \hline \end{array}$	$\begin{array}{c} 0.55 \pm 0.55 \\$	$\begin{array}{c} 0.41 \pm 0.41 \\$
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 ± 0.55	0.48 ± 0.18	0.12 ± 0.07				
	1 lepton	1.74 ± 0.55	0.48 ± 0.18	0.12 ± 0.07 0.12 ± 0.07				
	1 lepton, from W	1.74 ± 0.05 1.74 ± 0.55	0.48 ± 0.18	0.12 ± 0.07 0.12 ± 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 ± 0.55	0.48 ± 0.18	0.12 ± 0.07				
	1 lepton	1.74 ± 0.55	0.48 ± 0.18	0.12 ± 0.07				
W+Jets $\rightarrow \ell \nu$	1 lepton, from W	1.74 ± 0.55	0.48 ± 0.18	0.12 ± 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 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} \\ \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 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} \\ \end{array} $			- - - - - - - - - - - - - - - - - - -				
W+Jets $\rightarrow \ell \nu,400 < HT < 600,{ m madgraph}$ pythia 8	$\begin{array}{c c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \\ Inclusve \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \\ Inclusve \\ 1 \text{ lepton} \end{array}$		- - - - - - - -					
	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \hline \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \hline \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ \end{array}$							
W+Jets $ o \ell \nu$, 400 < HT < 600, madgraph pythia8 W+Jets $ o \ell \nu$, 600 < HT < 800, madgraph pythia8	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \\ Inclusve \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ \hline Z \rightarrow \nu\nu \\ \hline \\ Inclusve \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 lepto$		- - - - - - - -					
	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \\ Inclusve \\ 1 \text{ lepton} \\ 1 \text{ lepton from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \\ Inclusve \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \end{array}$							
	$\begin{array}{c} 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \\ \hline \\ Inclusve \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ \hline Z \rightarrow \nu\nu \\ \hline \\ Inclusve \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 \text{ lepton, from } W \\ \hline \\ 1 lepto$							

Table 11 - continued from previous page

Table 1	1 - continued from			
-		≥4jets	≥4jets	≥4jets
Sample	Classification	MT2W < 200	MT2W < 200	MT2W < 200
		250 < MET < 350	350 < MET < 450	MET > 450
	Inclusve	0.81 ± 0.14	0.14 ± 0.06	0.05 ± 0.03
	1 lepton	0.81 ± 0.14	0.14 ± 0.06	0.05 ± 0.03
W+Jets $\rightarrow \ell \nu$, 800 < HT < 1200, madgraph pythia8	1 lepton, from W	0.81 ± 0.14	0.14 ± 0.06	0.05 ± 0.03
w +3ets→ εν, 800 < 111 < 1200, madgraph pythias	1 lepton, from t	_	_	_
	\geq 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	_	0.34 ± 0.17	0.07 ± 0.07
	1 lepton	_	0.34 ± 0.17	0.07 ± 0.07
W+Jets $\rightarrow \ell \nu$, 1200 $< HT < 2500$, madgraph pythia8	1 lepton, from W	_	0.34 ± 0.17	0.07 ± 0.07
W + 3cts -> cv, 1200 < 111 < 2000, madgraph pythiao	1 lepton, from t	_	_	_
	\geq 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_		_
	Inclusve	0.01 ± 0.00	_	_
	1 lepton	0.01 ± 0.00	_	-
W+Jets $\rightarrow \ell \nu$, 2500 $< HT < Inf$, madgraph pythia8	1 lepton, from W	0.01 ± 0.00	_	-
W+Jets→ €D, 2000 < 111 < 1mJ, madgraphi pythias	1 lepton, from t	_	_	_
	\geq 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	_		_
<u> </u>	Inclusve	9.89 ± 0.64	2.30 ± 0.29	0.81 ± 0.15
	1 lepton	0.21 ± 0.07	0.06 ± 0.03	-0.01 ± 0.02
Rare	1 lepton, from W	0.12 ± 0.05	_	-
itare	1 lepton, from t	0.09 ± 0.04	0.06 ± 0.03	-0.01 ± 0.02
	\geq 2 leptons	7.34 ± 0.63	1.79 ± 0.29	0.71 ± 0.15
	$Z \rightarrow \nu \nu$	2.33 ± 0.04	0.45 ± 0.02	0.11 ± 0.01
	Inclusve	1.66 ± 0.37	0.35 ± 0.15	0.09 ± 0.05
	1 lepton	0.08 ± 0.04	_	_
diBoson	1 lepton, from W	0.08 ± 0.04	_	_
4120001	1 lepton, from t	-	-	
	≥ 2 leptons	1.52 ± 0.36	0.34 ± 0.15	0.08 ± 0.05
	$Z \rightarrow \nu \nu$	0.06 ± 0.01	0.02 ± 0.00	0.01 ± 0.00
	Inclusve	0.87 ± 0.31	0.18 ± 0.13	_
	1 lepton	_	_	_
WW	1 lepton, from W	_	_	_
	1 lepton, from t			_
	≥ 2 leptons	0.87 ± 0.31	0.18 ± 0.13	_
	$Z \rightarrow \nu \nu$		- 0.10 0.10	_
	Inclusve	0.87 ± 0.31	0.18 ± 0.13	_
	1 lepton	_	-	_
$WW \rightarrow 2\ell 2\nu$, powheg	1 lepton, from W 1 lepton, from t	_	_	
	> 2 leptons	0.87 ± 0.31	0.18 ± 0.13	
	$Z \rightarrow \nu \nu$	0.87 ± 0.31	U.10 ± U.13	
	$Z \rightarrow \nu\nu$ Inclusve			_
	1 lepton			
	1 lepton 1 lepton, from W			
$WW \rightarrow \ell \nu qq$, powheg	1 lepton, from t			
	> 2 leptons			
	$Z \rightarrow \nu \nu$			_
	Inclusve	0.67 ± 0.19	0.15 ± 0.08	0.08 ± 0.05
	1 lepton	0.07 ± 0.19 0.08 ± 0.04	0.10 ± 0.00	
	1 lepton, from W	0.08 ± 0.04 0.08 ± 0.04		_
WZ	1 lepton, from t	- 0.00 1		_
	> 2 leptons	0.59 ± 0.18	0.15 ± 0.08	0.08 ± 0.05
	$Z \rightarrow \nu \nu$	0.00 ± 0.10	0.10 ± 0.00	
	Inclusve	0.57 ± 0.18	0.13 ± 0.08	0.07 ± 0.05
	1 lepton	0.07 ± 0.10	- 0.10 ± 0.00	
	1 lepton, from W		_	_
$WZ \rightarrow 3\ell\nu$, powheg pythia8	1 lepton, from t		_	_
	> 2 leptons	0.57 ± 0.18	0.13 ± 0.08	0.07 ± 0.05
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	0.57 ± 0.18	0.13 ± 0.08	0.07 ± 0.05

Table	11 -	continued	from	previous	nage

	Table 11 – continued from			
		≥4jets	≥4jets	≥4jets
Sample	Classification	MT2W < 200	MT2W < 200	MT2W < 200
		250 < MET < 350	350 < MET < 450	MET > 450
	Inclusve	0.03 ± 0.02	0.02 ± 0.02	0.01 ± 0.01
	1 lepton	_	_	_
$WZ \rightarrow 2\ell 2Q$, amenlo pythia8	1 lepton, from W	_	_	_
13	1 lepton, from t			
	≥ 2 leptons	0.03 ± 0.02	0.02 ± 0.02	0.01 ± 0.01
	$Z \rightarrow \nu \nu$			
	Inclusve 1 lepton	0.08 ± 0.04 0.08 ± 0.04	_	_
	1 lepton W	0.08 ± 0.04 0.08 ± 0.04	-	_
$WZ \rightarrow \ell \nu 2Q$, amenlo pythia8	1 lepton, from t	0.08 ± 0.04		
	> 2 leptons			_
	$Z \rightarrow \nu \nu$			_
	Inclusve	_		_
	1 lepton	_	_	_
	1 lepton, from W	_	_	_
$WZ \rightarrow 1\ell 3\nu$, amenlo pythia8	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	l —
	$Z \rightarrow \nu \nu$	_	_	_
	Inclusve	0.12 ± 0.02	0.02 ± 0.01	0.01 ± 0.00
	1 lepton	_	_	_
ZZ	1 lepton, from W	_	_	_
E E	1 lepton, from t	_	-	_
	≥ 2 leptons	0.06 ± 0.02	0.01 ± 0.01	
	$Z \rightarrow \nu \nu$	0.06 ± 0.01	0.02 ± 0.00	0.01 ± 0.00
	Inclusve	0.06 ± 0.02	0.01 ± 0.01	_
	1 lepton	_	_	_
$ZZ\rightarrow 2\ell 2Q$, amcnlo pythia8	1 lepton, from W	_	_	
	1 lepton, from t > 2 leptons	0.06 ± 0.02	0.01 ± 0.01	_
	$Z \rightarrow \nu \nu$	0.06 ± 0.02	0.01 ± 0.01	_
	Inclusve	0.07 ± 0.01	0.02 ± 0.00	0.01 ± 0.00
	1 lepton	0.07 ± 0.01	0.02 ± 0.00	0.01 ± 0.00
	1 lepton, from W	_	_	
$ZZ\rightarrow 2\ell 2\nu$, powheg pythia8	1 lepton, from t	_	_	_
	> 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	0.07 ± 0.01	0.02 ± 0.00	0.01 ± 0.00
	Inclusve	-0.00 ± 0.00		_
	1 lepton	_	_	_
$ZZ\rightarrow 2Q2\nu$, amenlo pythia8	1 lepton, from W	_	_	_
22 ·242F, amenio pytinae	1 lepton, from t	_	_	_
	≥ 2 leptons	_	_	_
	$Z \rightarrow \nu \nu$	-0.00 ± 0.00		
	Inclusve	8.23 ± 0.52	1.94 ± 0.25	0.71 ± 0.14
	1 lepton	0.13 ± 0.05	0.06 ± 0.03	-0.01 ± 0.02
$t\bar{t} + V$	1 lepton, from W	0.04 ± 0.03	0.06 ± 0.03	0.01 ± 0.00
	1 lepton, from t	0.09 ± 0.04	0.06 ± 0.03 1.46 ± 0.25	-0.01 ± 0.02
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	5.82 ± 0.52 2.27 ± 0.04	0.43 ± 0.25 0.43 ± 0.02	0.63 ± 0.14 0.10 ± 0.01
	$Z \rightarrow \nu\nu$ Inclusve	4.96 ± 0.52	0.43 ± 0.02 1.34 ± 0.25	0.10 ± 0.01 0.58 ± 0.14
	1 lepton	0.10 ± 0.05	0.05 ± 0.03	-0.02 ± 0.02
_	1 lepton, from W	0.10 ± 0.03 0.04 ± 0.03	- 0.00	0.02 ± 0.02
$t \bar{t} + W$	1 lepton, from t	0.04 ± 0.03 0.06 ± 0.04	0.05 ± 0.03	-0.02 ± 0.02
	> 2 leptons	4.86 ± 0.52	1.30 ± 0.25	0.60 ± 0.14
	$Z \rightarrow \nu \nu$			
	Inclusve	3.18 ± 0.45	0.92 ± 0.22	0.36 ± 0.11
	1 lepton	0.04 ± 0.03	= = :	
$t\bar{t} + W \rightarrow \ell\nu$, amenlo pythia8	1 lepton, from W	0.04 ± 0.03	_	_
$\iota\iota + vv \rightarrow \iota\nu$, amenio pytnias	1 lepton, from t	_	_	_
	≥ 2 leptons	3.14 ± 0.45	0.92 ± 0.22	0.36 ± 0.11
	$Z \rightarrow \nu \nu$	_		
			Continu	ed on next page

Table 11 - continued from previous page

Table 11 – 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			
$t\bar{t} + W \rightarrow QQ$, 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} 1.78 \pm 0.25 \\ 0.06 \pm 0.04 \\ -0.06 \pm 0.04 \\ 1.72 \pm 0.25 \\ -0.03 \pm 0.00 \end{array} $	$ \begin{array}{c} 0.42 \pm 0.13 \\ 0.05 \pm 0.03 \\ -0.05 \pm 0.03 \\ 0.05 \pm 0.03 \\ 0.38 \pm 0.13 \\ -0.60 \pm 0.02 \\ 0.01 \pm 0.00 \\ \end{array} $	0.22 ± 0.08 -0.02 ± 0.02 -0.02 ± 0.02 0.24 ± 0.08 -0.13 ± 0.01 0.00 ± 0.00			
$tar{t}+Z$	1 lepton, from W 1 lepton, from t \geq 2 leptons $Z \rightarrow \nu \nu$	$\begin{array}{c} - \\ 0.03 \pm 0.00 \\ 0.96 \pm 0.03 \\ 2.27 \pm 0.04 \end{array}$	$\begin{array}{c}$	$\begin{array}{c}\\ 0.00 \pm 0.00\\ 0.03 \pm 0.00\\ 0.10 \pm 0.01 \end{array}$			
$tar{t}+Z,\ \mathrm{madgraph}$	Inclusve 1 lepton 1 lepton, from W 1 lepton, from t \geq 2 leptons $Z \rightarrow \nu \nu$	$\begin{array}{c} 3.27 \pm 0.05 \\ 0.03 \pm 0.00 \\$	$\begin{array}{c} 0.60 \pm 0.02 \\ 0.01 \pm 0.00 \\$	$\begin{array}{c} 0.13 \pm 0.01 \\ 0.00 \pm 0.00 \\$			
$t ar t + Z \! ightarrow \! Q Q,$ amc nlo pythia8	Inclusve 1 lepton 1 lepton, from W 1 lepton, from t \geq 2 leptons $Z \rightarrow \nu \nu$	$\begin{array}{c} 2.18 \pm 0.39 \\ 0.13 \pm 0.08 \\ \hline \\ 0.13 \pm 0.08 \\ 2.04 \pm 0.38 \\ \hline \\ \end{array}$	$\begin{array}{c} 0.33 \pm 0.16 \\ 0.03 \pm 0.03 \\$	0.30 ± 0.08 			
$tar{t} + Z { ightarrow} 2\ell 2 u,$ amenlo pythia 8	Inclusve 1 lepton 1 lepton, from W 1 lepton, from t \geq 2 leptons $Z \rightarrow \nu \nu$	$\begin{array}{c} 2.16 \pm 0.45 \\ - \\ - \\ - \\ - \\ 1.56 \pm 0.39 \\ 0.60 \pm 0.23 \end{array}$	0.88 ± 0.19 $ 0.63 \pm 0.13$ 0.25 ± 0.14	0.19 ± 0.10 0.19 \pm 0.08 -0.00 \pm 0.05			

CR2l, Nominal Systematic, Yield Table for Input Samples

	CR2I, Nomii		able for Input Samples			
		≥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
Data, single e/μ , MET	Inclusve	132.00 ± 11.49	37.00 ± 6.08	14.00 ± 3.74	3.00 ± 1.73	3.00 ± 1.73
	Inclusve	168.85 ± 10.59	49.71 ± 5.35	16.78 ± 1.28	7.82 ± 1.37	3.02 ± 0.52
	1 lepton	19.28 ± 1.89	7.23 ± 1.25	2.44 ± 0.48	1.72 ± 0.63	0.55 ± 0.28
	1 lepton, from W	3.69 ± 0.79	2.10 ± 0.76	0.41 ± 0.12	0.97 ± 0.51	0.38 ± 0.28 0.38 ± 0.25
All Background	1 lepton, from t	15.59 ± 1.79	5.13 ± 0.98	2.03 ± 0.46	0.75 ± 0.31 0.75 ± 0.37	0.38 ± 0.23 0.18 ± 0.13
	> 2 leptons	148.45 ± 10.42	42.14 ± 5.20	14.19 ± 1.19	6.06 ± 1.22	2.40 ± 0.13
	$Z \rightarrow \nu \nu$	1.11 ± 0.06	0.34 ± 0.02	0.15 ± 0.05	0.04 ± 0.01	0.06 ± 0.04
	Inclusve	157.90 ± 4.13	44.51 ± 1.99	15.52 ± 1.25	4.21 ± 0.64	1.99 ± 0.36
	1 lepton	157.90 ± 4.13 15.71 ± 1.71	5.11 ± 0.98	1.99 ± 0.46	0.75 ± 0.37	0.18 ± 0.13
	1 lepton, from W	15.71 ± 1.71	3.11 ± 0.96	1.99 ± 0.40	0.73 ± 0.37	0.10 ± 0.13
$tar{t}$	1 lepton, from t	15.71 ± 1.71	5.11 ± 0.98	1.99 ± 0.46	0.75 ± 0.37	0.18 ± 0.13
	> 2 leptons	142.18 ± 3.75	39.40 ± 1.73	13.53 ± 1.16	3.47 ± 0.52	1.81 ± 0.13
	$Z \rightarrow \nu \nu$	142.18 ± 3.73	39.40 ± 1.73	13.33 ± 1.10	3.47 ± 0.32	1.81 ± 0.33
	$Z \rightarrow \nu\nu$ Inclusve	$-$ 7.64 \pm 1.52	2.36 ± 0.88	0.87 ± 0.39	0.51 ± 0.36	0.11 ± 0.11
		7.64 ± 1.52 7.64 ± 1.52	2.36 ± 0.88 2.36 ± 0.88	0.87 ± 0.39 0.87 ± 0.39	0.51 ± 0.36 0.51 ± 0.36	0.11 ± 0.11 0.11 ± 0.11
	1 lepton 1 lepton, from W	7.04 ± 1.32	2.30 ± 0.88	0.87 ± 0.39	0.51 ± 0.56	0.11 ± 0.11
$t\bar{t}$, single lepFromT, madgraph pythia8		7.64 ± 1.52	2.36 ± 0.88	0.87 ± 0.39	0.51 ± 0.36	0.11 ± 0.11
	1 lepton, from t	7.04 ± 1.32	2.30 ± 0.88	0.87 ± 0.39	0.51 ± 0.50	0.11 ± 0.11
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	_	_	_	_	_
				_	_	
	Inclusve	8.07 ± 0.79	2.74 ± 0.43	1.12 ± 0.24	0.24 ± 0.11	0.07 ± 0.07
	1 lepton	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 W			1 10 1 0 04		
, , , , , , , , , , , , , , , , , , , ,	1 lepton, from t	8.07 ± 0.79	2.74 ± 0.43	1.12 ± 0.24	0.24 ± 0.11	0.07 ± 0.07
	≥ 2 leptons	_	_	_	_	_
	$Z \rightarrow \nu \nu$	- 140 10 0 77		- 10.50 1.10		1.01 0.00
	Inclusve	142.18 ± 3.75	39.40 ± 1.73	13.53 ± 1.16	3.47 ± 0.52	1.81 ± 0.33
	1 lepton	_	_	_	_	_
$t\bar{t}$, diLepton, madgraph pythia8, ext1	1 lepton, from W	_	_	_	_	_
, , , , , , , , , , , , , , , , , , , ,	1 lepton, from t					
	≥ 2 leptons	142.18 ± 3.75	39.40 ± 1.73	13.53 ± 1.16	3.47 ± 0.52	1.81 ± 0.33
	$Z \rightarrow \nu \nu$			_		_
	Inclusve	8.92 ± 2.40	3.69 ± 1.54	_	2.55 ± 1.16	_
	1 lepton	-0.16 ± 0.16	_	_	0.39 ± 0.39	_
single t	1 lepton, from W	_	_	_	0.39 ± 0.39	_
8	1 lepton, from t	-0.16 ± 0.16		_		_
	≥ 2 leptons	9.08 ± 2.40	3.69 ± 1.54	_	2.16 ± 1.09	_
	$Z \rightarrow \nu \nu$		<u> </u>	_		
	Inclusve	9.08 ± 2.40	3.69 ± 1.54	_	2.55 ± 1.16	_
	1 lepton	_	_	_	0.39 ± 0.39	_
single $t \ t - W$ -channel	1 lepton, from W	_	_	_	0.39 ± 0.39	_
	1 lepton, from t	l -	l -	_		_
	≥ 2 leptons	9.08 ± 2.40	3.69 ± 1.54	_	2.16 ± 1.09	_
	$Z \rightarrow \nu \nu$	_	_	_	_	
	Inclusve	_	_	_	_	_
	1 lepton	_	_	_		_
single t , $t - W$ -channel, powheg pythia8	1 lepton, from W	_	_	_		_
3 , , , , ,	1 lepton, from t	_	_	_		_
	≥ 2 leptons	_	_	_		_
	$Z \rightarrow \nu \nu$			_		
	Inclusve	9.08 ± 2.40	3.69 ± 1.54	_	2.55 ± 1.16	_
	1 lepton	_	_	_	0.39 ± 0.39	_
single \bar{t} , $t - W$ -channel, powheg pythia8	1 lepton, from W	_	_	_	0.39 ± 0.39	_
single ι , $\iota - w$ -channel, powneg pythias	1 lepton, from t	l ,	l	_	-	_
	> 2 leptons	9.08 ± 2.40	3.69 ± 1.54	_	2.16 ± 1.09	_
				_		_
	$Z \rightarrow \nu \nu$	_	_	_		
	$Z \rightarrow \nu \nu$ Inclusve	-0.16 ± 0.16		_	_	_
	$Z \rightarrow \nu \nu$ Inclusve 1 lepton	$ \begin{array}{c} -0.16 \pm 0.16 \\ -0.16 \pm 0.16 \end{array} $				_
	Z o u Inclusve 1 lepton 1 lepton, from W	-0.16 ± 0.16			 	=
single t non $t-W$ -channel	$Z \rightarrow \nu \nu$ Inclusve 1 lepton 1 lepton, from W 1 lepton, from t				_ _ _ _	_ _ _ _
	Z o u Inclusve 1 lepton 1 lepton, from W	-0.16 ± 0.16			_ _ _ _ _	

Table 12 - continued from previous page

	Table	12 - continued from				
		≥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
	7 1		, , ,		, , , , , , , , , , , , , , , , , , , ,	,
	Inclusve	-0.16 ± 0.16	-		_	_
	1 lepton	-0.16 ± 0.16	_	_	_	_
ingle t, s-channel, amcnlo pythia8	1 lepton, from W	_	_	_	_	_
ingle t, s-channel, amenio pytinao	1 lepton, from t	-0.16 ± 0.16	<u>—</u>	_		_
	> 2 leptons	_	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_	_
	Inclusve	-5.87 ± 9.43	-2.59 ± 4.69	0.36 ± 0.12	0.53 ± 0.32	0.38 ± 0.25
	1 lepton	3.53 ± 0.79	2.04 ± 0.76	0.36 ± 0.12	0.53 ± 0.32	0.38 ± 0.25
	1 lepton, from W	3.53 ± 0.79	2.04 ± 0.76 2.04 ± 0.76	0.36 ± 0.12 0.36 ± 0.12	0.53 ± 0.32 0.53 ± 0.32	0.38 ± 0.25
/+Jets	1 lepton, from t	3.33 ± 0.79	2.04 ± 0.70	0.30 ± 0.12	0.33 ± 0.32	0.38 ± 0.23
		0.40 0.40	4 69 1 4 69	-		
	≥ 2 leptons	-9.40 ± 9.40	-4.63 ± 4.63	_	_	_
	$Z \rightarrow \nu \nu$		-		_	_
	Inclusve	-9.40 ± 9.40	-4.63 ± 4.63	_	_	_
	1 lepton	_	-	-	-	_
237 1 44	1 lepton, from W	_	_	_	_	_
$\text{DY+Jets} \rightarrow \ell\ell$	1 lepton, from t	_	_	_	_	_
	> 2 leptons	-9.40 ± 9.40	-4.63 ± 4.63	_		_
	$Z \rightarrow \nu \nu$			<u> </u>		_
	Inclusve	_	_	_		_
	1 lepton	_	_	_	_	_
		_	_	_	_	
OY+Jets→ ℓℓ, M10to50, amenlo pythia8	1 lepton, from W	_	_	-	_	_
1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	1 lepton, from t	_		_	_	_
	≥ 2 leptons	_	_	_	_	_
	$Z \rightarrow \nu \nu$	_	_	_	_	_
	Inclusve	-9.40 ± 9.40	-4.63 ± 4.63		_	_
	1 lepton	_	_	_	_	_
	1 lepton, from W	_	_	_		_
OY+Jets→ ℓℓ, M50, amcnlo pythia8	1 lepton, from t		_			_
	> 2 leptons	-9.40 ± 9.40	-4.63 ± 4.63			
	$Z \rightarrow \nu \nu$	-9.40 ± 9.40	-4.03 <u>+</u> 4.03			
	$Z \rightarrow \nu \bar{\nu}$					
	Inclusve	3.53 ± 0.79	2.04 ± 0.76	0.36 ± 0.12	0.53 ± 0.32	0.38 ± 0.25
	1 lepton	3.53 ± 0.79	2.04 ± 0.76	0.36 ± 0.12	0.53 ± 0.32	0.38 ± 0.25
$V+\mathrm{Jets} \rightarrow \ell \nu$	1 lepton, from W	3.53 ± 0.79	2.04 ± 0.76	0.36 ± 0.12	0.53 ± 0.32	0.38 ± 0.25
V UCUS -	1 lepton, from t	_	-	-	-	_
	> 2 leptons	_	_	_	<u>—</u>	_
	$Z \rightarrow \nu \nu$	_	_	_	_	_
	Inclusve	_	_		_	_
	1 lepton	_	_	_		_
	1 lepton, from W	_				
$V+Jets \rightarrow \ell \nu$, $100 < HT < 200$, madgraph pythia8	1 lepton, from t					
		_	_	_	_	
	≥ 2 leptons	_	_	_		_
	$Z \rightarrow \nu \nu$	_	_	_	_	_
	Inclusve	_	_	_	_	_
	1 lepton	_	_	_	<u> </u>	_
TILT. 4 000 - TTT - 400 1 1 1 11 0	1 lepton, from W	_	_	_		_
W+Jets $\rightarrow \ell \nu$, 200 < HT < 400, madgraph pythia8	1 lepton, from t	_	_	_		_
V+Jets $\rightarrow \ell \nu$, 200 $< HT < 400$, madgraph pythia8				_		_
$N+{ m Jets} ightarrow \ell u, 200 < HT < 400, madgraph pythias$		_				1
V+Jets $ ightarrow \ell u,~200 < HT < 400,~{ m madgraph}~{ m pythias}$	≥ 2 leptons	_		<u> </u>		
$N + \text{Jets} \rightarrow \ell \nu$, 200 < HT < 400, madgraph pythia8	$\geq 2 ext{ leptons} \ Z o u u$	_			_	
ν +Jets $\rightarrow \ell \nu$, 200 $<$ HT $<$ 400, madgraph pytma8	$\geq 2 \text{ leptons}$ $Z \to \nu \nu$ Inclusve	 0.67 ± 0.67	0.70 ± 0.70	<u> </u>	<u> </u>	<u> </u>
N +Jets $\rightarrow \ell \nu,~200 < HT < 400,~{ m madgraph}$ pytnia8	$\geq 2 ext{ leptons}$ $Z o u u$ Inclusve 1 lepton	$\begin{array}{c} - \\ 0.67 \pm 0.67 \\ 0.67 \pm 0.67 \end{array}$	0.70 ± 0.70	<u>–</u> – –	<u> </u>	
		\begin{matrix}	$\begin{array}{c} 0.70 \pm 0.70 \\ 0.70 \pm 0.70 \end{array}$	<u>–</u> – – –	— — — —	
$N+{ m Jets} ightarrow \ell u,~200 < HT < 400,~{ m madgraph~pythia8}$ $N+{ m Jets} ightarrow \ell u,~400 < HT < 600,~{ m madgraph~pythia8}$		$\begin{array}{c}$	0.70 ± 0.70			
		\begin{matrix}	$\begin{array}{c} 0.70 \pm 0.70 \\ 0.70 \pm 0.70 \end{array}$		— — — — —	— — — — —
		$\begin{array}{c}$	$\begin{array}{c} 0.70 \pm 0.70 \\ 0.70 \pm 0.70 \end{array}$	— — — — —		
		$\begin{array}{c}$	$\begin{array}{c} 0.70 \pm 0.70 \\ 0.70 \pm 0.70 \\$	_ _ _	— — — — —	— — — — —
	$ \begin{array}{c} \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \\ \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \\ \\ \text{Inclusve} \end{array} $		$\begin{array}{c} 0.70 \pm 0.70 \\ 0.70 \pm 0.70 \\ - \\ - \\ - \\ - \\ 0.06 \pm 0.06 \end{array}$	_ _ _ _		— — — — — —
V+Jets $\rightarrow \ell \nu, 400 < HT < 600, { m madgraph pythia8}$			$\begin{array}{c} 0.70 \pm 0.70 \\ 0.70 \pm 0.70 \\$	_ _ _ _		— — — — — —
			$\begin{array}{c} 0.70 \pm 0.70 \\ 0.70 \pm 0.70 \\ - \\ - \\ - \\ - \\ 0.06 \pm 0.06 \end{array}$	_ _ _ _		——————————————————————————————————————
V+Jets $\rightarrow \ell \nu, 400 < HT < 600, { m madgraph pythia8}$		$ \begin{array}{c} - \\ 0.67 \pm 0.67 \\ 0.67 \pm 0.67 \\ 0.67 \pm 0.67 \\ - \\ - \\ 0.86 \pm 0.25 \\ 0.86 \pm 0.25 \\ 0.86 \pm 0.25 \\ \end{array} $	$\begin{array}{c} 0.70 \pm 0.70 \\ 0.70 \pm 0.70 \\$	_ _ _ _	- - - - - - - - - - - - - - - - - - -	— — — — — — —
V+Jets $\rightarrow \ell \nu, 400 < HT < 600, { m madgraph pythia8}$		$ \begin{array}{c}$	$\begin{array}{c} 0.70 \pm 0.70 \\ 0.70 \pm 0.70 \\$	_ _ _ _	——————————————————————————————————————	

Table 12 - continued from previous page

Inclusive Description De		Table	12 - continued from	previous page			
Inclusive Description De			≥4jets	≥4jets			
Figure 1.44 1.02 0.53 1.11 0.22 0.07 - 0.01 1.00 0.01 1.00 0.02 1.00 0.01 1.00 0.02 1.00 0.02 1.00 0.01 1.00 0.02 1.00 0.0	Sample	Classification	MT2W> 200	MT2W> 200	MT2W> 200	MT2W > 200	MT2W > 200
$ \begin{array}{c} 1 & \text{lapton} \\ \text{Y-lets} = \ell \nu, 800 < HT < 1200, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 800 < HT < 1200, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 800 < HT < 1200, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 800 < HT < 2500, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 2500, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 2500, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 1200, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 1200, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < 100, \text{ madgraph pythis8} \\ \text$			250 < MET < 350	350 < MET < 450	450 < MET < 550	550 < MET < 650	MET > 650
$ \begin{array}{c} 1 & \text{lapton} \\ \text{Y-lets} = \ell \nu, 800 < HT < 1200, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 800 < HT < 1200, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 800 < HT < 1200, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 800 < HT < 2500, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 2500, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 2500, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 1200, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 1200, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < HT < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < 100, \text{ madgraph pythis8} \\ \text{Y-lets} = \ell \nu, 1200 < 100, \text{ madgraph pythis8} \\ \text$		T 1	1 11 0 00	0.50 0.11	0.00 0.07		0.01 0.01
$V_{-} Jets \leftarrow \ell \nu, 800 < HT < 1200, madgraph pythis8 $						_	
$ \begin{array}{c} 1 \text{ lipton, fron } t \\ \geq 2 \text{ leptons} \\ \text{V+Jets-} \ell \nu, 1200 < HT < 1200, \text{madgraph pythias} \\ \end{array} \begin{array}{c} 1 \text{ liepton, fron } t \\ \geq 2 \text{ leptons} \\ \text{lepton} \\ \text{lepton, fron } t \\ \text{lepton, fron } t \\ \geq 2 \text{ leptons} \\ \text{lepton, fron } t \\ \text{lepton, fron } t \\ \geq 2 \text{ leptons} \\ \text{lepton, fron } t \\ \geq 2 \text{ leptons} \\ \text{lepton, fron } t \\ \text{lepton, fron }$						_	
1 1 1 1 1 1 1 1 1 1	W+Jets $\rightarrow \ell \nu$, 800 < HT < 1200, madgraph pythia8		1.41 ± 0.20		0.22 ± 0.07	-	0.01 ± 0.01
$ \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$			_	_	-	_	_
$ \begin{array}{c} V_{+} \\ V_{-} $		$Z \rightarrow \nu \nu$	_	_	-	_	_
$ V_{\rm period} V_$		Inclusve	0.55 ± 0.25	0.74 ± 0.27	0.14 ± 0.10	0.52 ± 0.32	0.35 ± 0.25
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		1 lepton	0.55 ± 0.25	0.74 ± 0.27	0.14 ± 0.10	0.52 ± 0.32	0.35 ± 0.25
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	TT	1 lepton, from W	0.55 ± 0.25	0.74 ± 0.27	0.14 ± 0.10	0.52 ± 0.32	0.35 ± 0.25
	W+Jets $\rightarrow \ell \nu$, 1200 $<$ HT $<$ 2500, madgraph pythia8	1 lepton, from t	<u> </u>	_	<u>—</u>	_	_
$V+ Jets \rightarrow t \nu, 2500 < HT < Inf, madgraph pythiab Inclusive 1.0 $			_	_	<u> </u>	_	_
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $					_	_	_
$V+Jets \rightarrow \ell \nu, 2500 < HT < Inf, madgraph pythias $			0.05 ± 0.02	0.01 ± 0.00	0.00 ± 0.00	0.01 ± 0.01	0.02 ± 0.01
$V_{\text{Lets}} \leftarrow t\nu, 2500 < HT < lnf, \text{ madgraph pythias} \\ 1 \text{lepton from } \\ \geq 2 \text{leptons} \\ \\ \text{tare} \\ \text{tare} \\ \text{lepton, from } t \\ 1 \text{lepton} \\ \text{lepton, from } W \\ 1 \text{lepton} \\ \text{lepton, from } W \\ 1 \text{lepton} \\ \text{lepton, from } W \\ 1 \text{lepton} \\ \text{lepton, from } W \\ 1 $							
$ \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$	W+Jets $\rightarrow \ell \nu$, 2500 < HT < Inf, madgraph pythia8		0.05 ± 0.03	0.01 ± 0.00	0.00 ± 0.00	0.01 ± 0.01	0.02 ± 0.01
Inclusive Inclu	, , , , , , , , , , , , , , , , , , , ,		_	_	_	_	_
Incluse 1 lepton from V 1 lepton, from V 1 lepton, from V 1 lepton V 1 lepton V 1 lepton V 1 lepton V 1 lepton V 2 leptons 2 leptons 2 leptons 1.82 0.35 0.65 0.65 0.65 0.65 0.65 0.65 0.65 0.6			_	_	_	_	_
tare 1 1 epton 0.19 \pm 0.08 0.08 \pm 0.03 0.08 \pm 0.04 0.05 \pm 0.04 - -					<u> </u>		
tare the proof of							0.65 ± 0.29
$ \begin{array}{c} \text{Tare} \\ & \begin{array}{c} 1 \text{ lepton, from } t \\ & \begin{array}{c} 2 \text{ leptons} \\ 2 l$							_
$VW = 2\ell 2\nu, \text{ powheg} \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Davo						_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Rare	1 lepton, from t	0.04 ± 0.04	0.02 ± 0.01	0.04 ± 0.02	0.00 ± 0.00	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		> 2 leptons	6.59 ± 0.65	3.67 ± 0.59	0.66 ± 0.24	0.44 ± 0.16	0.59 ± 0.28
Incluse 1.9e ± 0.38 1.79 ± 0.52 0.45 ± 0.16 0.30 ± 0.14 0.53 ± 0.27 1.9epton, from W 0.10 ± 0.04 0.04 ± 0.02 0.03 ± 0.03 0.04 ± 0.04 0.14 ± 0.02 0.03 ± 0.03 0.04 ± 0.04 0.12 ± 0.17 ± 0.12 0.17 ± 0.12 0.40 ± 0.22 0.03 ± 0.03 0.04 ± 0.04 0.04 ± 0.02 0.03 ± 0.03 0.04 ± 0.04 0.04 ± 0.02 0.05 ± 0.06 0.05 ± 0.06 0.05 ± 0.06 0.05 ± 0.06 0.05 ± 0.06 0.05 ± 0.06 0.05 ± 0.06 0.05 ± 0.06 0.05 ± 0.06 0.05 ± 0.06 0.05 ± 0.06 0.05 ± 0.06 0.05 ± 0.07 0.07 ± 0.05 0.01 ± 0.00 0.05 ± 0.06 0.05 ± 0.05 0.05			1.11 ± 0.06		0.15 ± 0.05	0.04 ± 0.01	0.06 ± 0.04
iBoson 1 lepton 0.10 \pm 0.04 0.04 \pm 0.02 0.03 \pm 0.03 0.04 \pm 0.04 0.04 0.02 0.03 \pm 0.03 0.04 \pm 0.04 0.04 0.02 0.03 \pm 0.03 0.04 \pm 0.04 0.04 0.02 0.03 \pm 0.03 0.04 \pm 0.04 0.04 0.02 0.03 \pm 0.05 \pm 0.05 \pm 0.05 \pm 0.05 \pm 0.05 \pm 0.05 \pm 0.06 0.05 \pm 0.06 0.05 \pm 0.01 0.07 \pm 0.05 0.01 \pm 0.00 0.05 \pm 0.01 0.07 \pm 0.05 0.01 \pm 0.00 0.05 \pm 0.01 0.07 \pm 0.05 0.01 \pm 0.00 0.05 \pm 0.01 0.07 \pm 0.05 0.01 \pm 0.07 \pm 0.05 0.01 \pm 0.07 \pm 0.07 \pm 0.17 \pm 0.12 0.40 \pm 0.22 0.17 \pm 0.17 \pm 0.12 0.40 \pm 0.22 0.17 \pm 0.17 \pm 0.12 0.40 \pm 0.22 0.17 \pm 0.17 \pm 0.12 0.40 \pm 0.22 0.17 \pm 0.17 \pm 0.12 0.40 \pm 0.22 0.18 \pm 0.19 0.							
Boson 1 lepton, from W 1 lepton, from W 2 leptons 1.82 ± 0.37 1.70 ± 0.52 0.33 ± 0.15 0.25 ± 0.13 0.48 ± 0.27 0.52 ± 0.06 0.05 ± 0.01 0.07 ± 0.05 0.01 ± 0.00 0.05 ± 0.01 0.07 ± 0.05 0.01 ± 0.00 0.05 ± 0.01 0.07 ± 0.05 0.01 ± 0.00 0.05 ± 0.01 0.07 ± 0.05 0.01 ± 0.02 0.05 ± 0.01 0.07 ± 0.05 0.01 ± 0.02 0.05 ± 0.01 0.07 ± 0.05 0.01 ± 0.02 0.05 ± 0.01 0.07 ± 0.05 0.01 ± 0.02 0.05 ± 0.01 0.07 ± 0.05 0.01 ± 0.02 0.05 ± 0.01 0.07 ± 0.05 0.01 ± 0.02 0.05 ± 0.01 0.07 ± 0.05 0.01 ± 0.02 0.05 ± 0.01 0.07 ± 0.05 0.01 ± 0.02 0.05 ± 0.01 0.07 ± 0.05 0.01 ± 0.02 0.05 ± 0.01 0.05 ± 0.01 0.07 ± 0.05 0.01 ± 0.12 0.17 ± 0.12 0.40 ± 0.26 0.05 ± 0.07 0.05 ± 0.07 0.05 ± 0.07 0.05 ± 0.07 0.05 ± 0.07 0.05 ± 0.07 0.05 ± 0.07 0.05 ± 0.07 0.05 ± 0.07 0.05 ± 0.07 0.05 ± 0.07 0.05 ± 0.07 0.05 ± 0.05 0.05 ± 0.07 0.05 ± 0.05 0.05 ± 0.07 0.05 ± 0.05 0.05 ± 0.05 0.05 ± 0.05 0.05 ± 0.05 0.05 ± 0.05 0.05 ± 0.05 0.05 ± 0.05 0.05 ± 0.05 0.05 ± 0.05 0.05 ± 0.05 0.05 ± 0.05 0.05 ± 0.05 0.05 ± 0.05 0.05 ± 0.03 0.08 ± 0.05 0.05 ± 0.05 0.05 ± 0.03 0.08 ± 0.05 0.05 ± 0.03 0.08 ± 0.05 0.05 ± 0.03 0.08 ± 0.05 0.05 ± 0.03 0.08 ± 0.05 0.05							0.00 ± 0.21
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$							
$VW \rightarrow UV = VV = VV = VV = VV = VV = VV = VV$	diBoson						_
$VW \rightarrow \ell \nu q q, \text{ powheg} \qquad \begin{array}{ c c c c c c c c c c c c c c c c c c c$							0.40 0.07
$VW \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$							
$VW = \begin{cases} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \end{cases} & 0.65 \pm 0.27 \\ Z \rightarrow \nu\nu \\ 0.65 \pm 0.27 \end{cases} & 1.24 \pm 0.49 \\ 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} \end{cases} & 0.65 \pm 0.27 \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \end{cases} & 0.65 \pm 0.27 \\ 2 \text{ leptons} \end{cases} & 0.65 \pm 0.27 \\ 2 \text{ leptons} \end{cases} & 0.65 \pm 0.27 \\ 2 \text{ leptons} \end{cases} & 0.65 \pm 0.27 \\ 2 \text{ leptons} \end{cases} & 0.65 \pm 0.27 \\ 2 \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{ 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 \\ 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{ lepton, from } W $							
$VW = \begin{cases} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \end{cases} = \begin{cases} 0.65 \pm 0.27 \\ 1.24 \pm 0.49 \\ 0.12 \pm 0.12 \\ 0.17 \pm 0.12 \end{cases} = \begin{cases} 0.40 \pm 0.26 \\ 0.40 \pm 0$			0.65 ± 0.27	1.24 ± 0.49	0.12 ± 0.12	0.17 ± 0.12	0.40 ± 0.26
$VW \rightarrow VV = \begin{cases} 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu\nu \end{cases} & 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 \text{ lepton} \end{cases} & 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 \text{ lepton, from } W & - & - & - & - & - & - & - \\ 1 \text{ lepton, from } W & - & - & - & - & - & - & - \\ 1 \text{ lepton, from } W & - & - & - & - & - & - & - \\ 2 \text{ 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 & - & - & - & - & - & - & - \\ 1 \text{ lepton, from } W & - & - & - & - & - & - \\ 1 \text{ lepton, from } W & - & - & - & - & - & - \\ 1 \text{ lepton, from } W & - & - & - & - & - & - \\ 1 \text{ lepton, from } W & - & - & - & - & - & - \\ 2 \text{ leptons} & - & - & - & - & - & - & - \\ Z \rightarrow \nu\nu & - & - & - & - & - & - & - \\ 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} & 0.10 \pm 0.04 & 0.04 \pm 0.02 & 0.03 \pm 0.03 & 0.04 \pm 0.04 & - \\ 1 \text{ lepton, from } W & - & - & - & - & - & - \\ 1 \text{ lepton, from } W & - & - & - & - & - & - \\ 2 \text{ leptons} & 0.05 \pm 0.05 & - & 0.05 \pm 0.05 & - & 0.04 \pm 0.06 \\ Z \rightarrow \nu\nu & -0.05 \pm 0.05 & - & 0.05 \pm 0.05 & - & 0.05 \pm 0.05 & - & 0.04 \pm 0.06 \\ VZ \rightarrow 3\ell\nu, \text{ powheg pythia8} & 1 \text{ lepton, from } t \\ \geq 2 \text{ 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 & - & - & - & - & - & - & - & - & - $			_	_	_	_	_
$VW \rightarrow 2\ell 2\nu, \text{ powheg} \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$	WW		_	_	_	_	_
$VW \to 2\ell 2\nu, \text{ powheg} \qquad \begin{array}{ c c c c c c c c c c c c c c c c c c c$	** **		_			_	_
$VW \to 2\ell 2\nu, \text{ powheg} \qquad \begin{array}{c} \text{Inclusve} \\ 1 \text{ lepton} \\ 1 \text{ lepton} \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \\ Z \to \nu\nu \\ \end{array} \qquad \begin{array}{c} - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - $			0.65 ± 0.27	1.24 ± 0.49	0.12 ± 0.12	0.17 ± 0.12	0.40 ± 0.26
$VW \to 2\ell 2\nu, \text{powheg} \qquad \begin{array}{c} 1 \text{lepton} & - & - & - & - & - & - & - & - & - & $		$Z \rightarrow \nu \nu$	_	_	_	_	_
$VW \to 2\ell 2\nu, \text{ powheg} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ 2 leptons} \\ Z \to \nu\nu \\ \\ VW \to \ell \nu qq, \text{ powheg} \\ \end{array} \begin{array}{c} 1 \text{ lepton, from } W \\ 2 \text{ 2 leptons} \\ Z \to \nu\nu \\ \end{array} \begin{array}{c} - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - $		Inclusve	0.65 ± 0.27	1.24 ± 0.49	0.12 ± 0.12	0.17 ± 0.12	0.40 ± 0.26
$VW \to 2\ell 2\nu, \text{ powheg} \\ \begin{array}{c} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ 2 leptons} \\ Z \to \nu\nu \\ \\ VW \to \ell \nu qq, \text{ powheg} \\ \end{array} \begin{array}{c} 1 \text{ lepton, from } W \\ 2 \text{ 2 leptons} \\ Z \to \nu\nu \\ \end{array} \begin{array}{c} - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - $		1 lepton	_	_	<u>—</u>	_	_
$VV \to 2\ell 2\nu, \text{powheg} \\ \begin{array}{c} 1 \text{lepton, from } t \\ \geq 2 \text{leptons} \\ Z \to \nu \nu \\ \end{array} \\ \begin{array}{c} Inclusve \\ 1 \text{lepton} \\ 1 \text{lepton, from } W \\ \end{array} \\ VW \to \ell \nu qq, \text{powheg} \\ \end{array} \begin{array}{c} Inclusve \\ 1 \text{lepton, from } W \\ 2 \text{lo6} \pm 0.26 \\ X \to \nu \nu \\ \end{array} \begin{array}{c} 1.06 \pm 0.26 \\ -0.05 \pm 0.05 \\ -0.05 \pm 0.05 \\ \end{array} \begin{array}{c} 0.31 \pm 0.15 \\ -0.05 \pm 0.05 \\ \end{array} \begin{array}{c} 0.03 \pm 0.03 \\ 0.04 \pm 0.04 \\ \end{array} \begin{array}{c} 0.04 \pm 0.04 \\ 0.04 \pm 0.04 \\ \end{array} \begin{array}{c} 0.23 \pm 0.08 \\ 0.07 \pm 0.04 \\ \end{array} \begin{array}{c} 0.08 \pm 0.08 \\ 0.05 \pm 0.05 \\ \end{array} \begin{array}{c} 0.05 \pm 0.03 \\ 0.08 \pm 0.08 \\ \end{array} \begin{array}{c} 0.08 \pm 0.08 \\ 0.$			_	_		_	_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$WW \rightarrow 2\ell 2\nu$, powheg		_	_	_		_
$VW \rightarrow \ell \nu qq, \text{powheg} \qquad \begin{array}{ c c c c c c c c } \hline Z \rightarrow \nu \nu \\ \hline & & & & & & & & & & & & & & & & & &$			0.65 ± 0.27	1.24 + 0.49	0.12 ± 0.12	0.17 ± 0.12	0.40 ± 0.26
$VW \rightarrow \ell \nu qq, \text{powheg} \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$			l 0.00 ± 0.2.	I		0.11 ± 0.12	
$VW \to \ell \nu q q, \ \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} - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - $			_	_	_		
$VW \to \ell \nu qq, \ \text{powheg} \qquad \begin{array}{c} 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } t \\ \geq 2 \ \text{leptons} \\ Z \to \nu \nu \\ \\ VZ \\ \end{array} \qquad \begin{array}{c} I \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton} \\ 1 \ \text{lepton} \\ 1 \ \text{lepton} \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 1 \ \text{lepton, from } W \\ 2 \ \text{leptons} \\ Z \to \nu \nu \\ \end{array} \qquad \begin{array}{c} 1.06 \pm 0.26 \\ -0.05 \pm 0.05 \\ \end{array} \qquad \begin{array}{c} 0.04 \pm 0.04 \\ -0.04 \pm 0.02 \\ \end{array} \qquad \begin{array}{c} 0.03 \pm 0.03 \\ 0.03 \pm 0.03 \\ \end{array} \qquad \begin{array}{c} 0.04 \pm 0.04 \\ -0.04 \pm 0.04 \\ \end{array} \qquad \begin{array}{c} 0.04 \pm 0.04 \\ -0.04 \pm 0.02 \\ \end{array} \qquad \begin{array}{c} 0.03 \pm 0.03 \\ \end{array} \qquad \begin{array}{c} 0.04 \pm 0.04 \\ -0.04 \pm 0.04 \\ \end{array} \qquad \begin{array}{c} 0.08 \pm 0.05 \\ \end{array} \qquad \begin{array}{c} 0.05 \pm 0.05 \\ \end{array} \qquad \begin{array}{c} 0.05 \pm 0.05 \\ \end{array} \qquad \begin{array}{c} 0.05 \pm 0.05 \\ \end{array} \qquad \begin{array}{c} 0.05 \pm 0.03 \\ \end{array} \qquad \begin{array}{c} 0.08 \pm 0.05 \\ \end{array} \qquad \begin{array}{$			_	_			_
$VV \to \ell \nu q q, \text{ powheg} \\ \begin{array}{c} 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \to \nu \nu \\ \end{array} \\ VZ \\ \\ \\ VZ \\ \\ \\ VZ \\ \\ \\ VZ \\ \\ \\ VZ \\ \\ \\ \\$			_	_			_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$WW \rightarrow \ell \nu qq$, powheg		_	_	_	_	_
$VZ = \begin{cases} Z \rightarrow \nu\nu & - & - & - & - & - & - & - & - & - $	*		_	_	_	_	_
$VZ = \begin{cases} & \text{Inclusve} \\ & 1 \text{ lepton} \\ & 1 \text{ lepton} \\ & 1 \text{ lepton, from } W \\ & 1 \text{ lepton, from } W \\ & 1 \text{ lepton, from } W \\ & 1 \text{ lepton from } W \\ & 1 \text{ lepton, from } W \\ & 1 \text{ lepton, from } W \\ & 1 \text{ lepton, from } W \\ & 2 \text{ leptons} \\ & Z \rightarrow \nu \nu \\ & VZ \Rightarrow 3\ell \nu \text{, powheg pythia8} \end{cases} = \begin{cases} 1.10 \pm 0.27 \\ 1 \text{ lepton, from } t \\ & 0.10 \pm 0.04 \\ & 0.10 \pm 0.04 \\ & 0.10 \pm 0.04 \\ & 0.04 \pm 0.02 \\ & 0.04 \pm 0.02 \\ & 0.04 \pm 0.02 \\ & 0.03 \pm 0.03 \\ & 0.03 \pm 0.03 \\ & 0.04 \pm 0.04 \\ & 0.04 \pm 0.04 \\ & 0.08 \pm 0.05 \\ & - & 0.05 \pm 0.05 \\ & - & 0.05 \pm 0.05 \\ & - & 0.05 \pm 0.05 \\ & - & - & - \\ & - & - & - \\ & - & - &$			_	_	_	_	_
$VZ = \begin{cases} & 1 \text{ lepton} \\ & 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} \\ & Z \rightarrow \nu \nu \end{cases} = \begin{pmatrix} 0.10 \pm 0.04 \\ 0.10 \pm 0.04 \\ 0.04 \pm 0.02 \\ 0.04 \pm 0.02 \\ 0.04 \pm 0.02 \\ 0.03 \pm 0.03 \\ 0.04 \pm 0.03 \\ 0.04 \pm 0.04 \\ 0.08 \pm 0.05 \\ 0.05 \pm 0.05 \\ 0.005 \pm 0.005 \\ $			<u> </u>	<u> </u>	<u> </u>		
$VZ = \begin{cases} 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 1 \text{ lepton, from } W \\ 2 \text{ leptons} \end{cases} = \begin{pmatrix} 0.00 \pm 0.04 \\ - \\ - \\ 2 \text{ leptons} \end{pmatrix} = \begin{pmatrix} 0.00 \pm 0.02 \\ - \\ - \\ 0.05 \pm 0.05 \\ - \\ - \\ 0.05 \pm 0.05 \end{pmatrix} = \begin{pmatrix} 0.03 \pm 0.03 \\ - \\ - \\ 0.23 \pm 0.08 \\ 0.07 \pm 0.04 \\ 0.07 \pm 0.04 \\ 0.08 \pm 0.05 \\ - \\ 0.04 \pm 0.04 \\ 0.08 \pm 0.05 \\ - \\ 0.04 \pm 0.04 \\ 0.08 \pm 0.05 \\ - \\ 0.05 \pm 0.05 \\ - \\ 0.05 \pm 0.05 \\ - \\ 0.04 \pm 0.04 \\ 0.08 \pm 0.05 \\ - \\ 0.08 \pm 0.05 \\ - \\ 0.08 \pm 0.05 \\ - \\ 0.08 \pm 0.05 \\ - \\ 0.08 \pm 0.05 \\ - \\ 0.08 \pm 0.05 \\ - \\ 0.08 \pm 0.05 \\ - \\ 0.08 \pm 0.05 \\ - \\ 0.08 \pm 0.05 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ $							0.12 ± 0.06
$VZ = \begin{cases} 1 \text{ lepton, from } t \\ \geq 2 \text{ leptons} \\ Z \rightarrow \nu \nu \end{cases} - \begin{cases} 0.40 \pm 0.16 \\ -0.05 \pm 0.05 \\ -0.05 \pm 0.05 \\ -0.05 \pm 0.05 \\ -0.05 \pm 0.05 \\ -0.05 \pm 0.05 \\ -0.05 \pm 0.05 \\ -0.05 \pm 0.05 \\ -0.05 \pm 0.05 \\ -0.05 \pm 0.05 \\ -0.05 \pm 0.05 \\ -0.05 \pm 0.05 \\ -0.05 \pm 0.05 \\ -0.05 \pm 0.05 \\ -0.05 \pm 0.05 \\ -0.05 \pm 0.03 \\ -0.05 \pm 0.05 \\ -0$							_
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	WZ		0.10 ± 0.04	0.04 ± 0.02	0.03 ± 0.03	0.04 ± 0.04	_
$Z \rightarrow \nu\nu \qquad \begin{array}{c ccccccccccccccccccccccccccccccccccc$	WZ	1 lepton, from t	_	_	_	_	_
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		> 2 leptons	1.06 ± 0.26	0.40 ± 0.16	0.23 ± 0.08	0.07 ± 0.04	0.08 ± 0.05
$VZ \rightarrow 3\ell\nu \text{, powheg pythia8} \begin{array}{c ccccccccccccccccccccccccccccccccccc$			-0.05 ± 0.05		0.05 ± 0.05		0.04 ± 0.04
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				0.31 ± 0.15		0.05 ± 0.03	
$VZ o 3\ell u$, powheg pythia8			I 0.00 ± 0.20	1	J 0.20 ± 0.00	0.00 ± 0.00	_ 0.00
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			_	_	_		_
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$WZ \rightarrow 3\ell\nu$, powheg pythia8		_	_	_	_	_
$oxed{Z} ightarrow u u u u u u u u u u u u u $			0.86 ± 0.35	0.21 ± 0.15	0.20 ± 0.08	0.05 ± 0.03	0.00 ± 0.05
		≥ 2 leptons	0.86 ± 0.25	0.31 ± 0.15	0.20 ± 0.08	U.US ± U.US	0.08 ± 0.05
Continued on next pag		$Z \rightarrow \nu \nu$			<u> </u>	_	

Table 12 – continued from previous 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 ± 0.06	0.10 ± 0.04	0.04 ± 0.02	0.02 ± 0.01	-0.00 ± 0.01	
	1 lepton	0.20 ± 0.00	0.10 ± 0.04	0.04 ± 0.02	0.02 ± 0.01	-0.00 ± 0.01	
	1 lepton, from W			_		_	
$WZ\rightarrow 2\ell 2Q$, amcnlo pythia8	1 lepton, from t					_	
	> 2 leptons	0.20 ± 0.06	0.10 ± 0.04	0.04 ± 0.02	0.02 ± 0.01	-0.00 ± 0.01	
	$Z \rightarrow \nu \nu$	0.20 ± 0.00	0.10 ± 0.01	0.01 ± 0.02	0.02 ± 0.01	- 0.00	
	Inclusve	0.10 ± 0.04	0.04 ± 0.02	0.03 ± 0.03	0.04 ± 0.04	_	
	1 lepton	0.10 ± 0.04 0.10 ± 0.04	0.04 ± 0.02 0.04 ± 0.02	0.03 ± 0.03	0.04 ± 0.04 0.04 ± 0.04	_	
	1 lepton, from W	0.10 ± 0.04	0.04 ± 0.02 0.04 ± 0.02	0.03 ± 0.03	0.04 ± 0.04 0.04 ± 0.04	_	
$WZ \rightarrow \ell \nu 2Q$, amenlo pythia8	1 lepton, from t	0.10 ± 0.01	0.01 ± 0.02	0.00 ± 0.00	0.01 ± 0.01	_	
	> 2 leptons		_			_	
	$Z \rightarrow \nu \nu$		_			_	
	Inclusve	-0.05 ± 0.05	_	0.05 ± 0.05	_	0.04 ± 0.04	
	1 lepton	-0.00 ± 0.00		0.00 ± 0.00		0.04 ± 0.04	
	1 lepton, from W					_	
$WZ\rightarrow 1\ell 3\nu$, amenlo pythia8	1 lepton, from t	_	_	_	_	_	
	> 2 leptons	_	_	_		_	
	$Z \rightarrow \nu \nu$	-0.05 ± 0.05	_	0.05 ± 0.05		0.04 ± 0.04	
	Inclusve	0.21 ± 0.04	0.10 ± 0.03	0.02 ± 0.01	0.01 ± 0.00	0.01 ± 0.00	
	1 lepton	l 5:21 ± 5:51	I 5.10 ± 5.00	1 0.02 ± 0.01			
	1 lepton, from W	_	_	_		_	
ZZ	1 lepton, from t	_	_	_		_	
	> 2 leptons	0.11 ± 0.03	0.05 ± 0.03	-0.00 ± 0.01	0.00 ± 0.00	_	
	$Z \rightarrow \nu \nu$	0.11 ± 0.01	0.05 ± 0.01	0.03 ± 0.01	0.01 ± 0.00	0.01 ± 0.00	
	Inclusve	0.11 ± 0.03	0.05 ± 0.03	-0.00 ± 0.01	0.00 ± 0.00		
	1 lepton					_	
	1 lepton, from W	_	_	_		_	
$ZZ\rightarrow 2\ell 2Q$, amenlo pythia8	1 lepton, from t	_	_	_		_	
	> 2 leptons	0.11 ± 0.03	0.05 ± 0.03	-0.00 ± 0.01	0.00 ± 0.00	_	
	$Z \rightarrow \nu \nu$					_	
	Inclusve	0.11 ± 0.01	0.05 ± 0.01	0.02 ± 0.01	0.01 ± 0.00	0.01 ± 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 ± 0.01	0.05 ± 0.01	0.02 ± 0.01	0.01 ± 0.00	0.01 ± 0.00	
	Inclusve	_	_	0.01 ± 0.01	_	_	
	1 lepton	_	_	_	_	_	
$ZZ\rightarrow 2Q2\nu$, amcnlo pythia8	1 lepton, from W	_	_	_	_	_	
22 - 292v, amenio pyrinao	1 lepton, from t	_	_	_	_	_	
	≥ 2 leptons	_	_	_	_	_	
	$Z \rightarrow \nu \nu$			0.01 ± 0.01	<u> </u>		
	Inclusve	5.93 ± 0.53	2.31 ± 0.29	0.44 ± 0.19	0.23 ± 0.10	0.12 ± 0.09	
	1 lepton	0.09 ± 0.07	0.04 ± 0.02	0.05 ± 0.03	0.00 ± 0.00		
$t\bar{t} + V$	1 lepton, from W	0.06 ± 0.06	0.02 ± 0.02	0.02 ± 0.02	-	_	
00 7	1 lepton, from t	0.04 ± 0.04	0.02 ± 0.01	0.04 ± 0.02	0.00 ± 0.00	-	
	≥ 2 leptons	4.77 ± 0.53	1.97 ± 0.29	0.31 ± 0.19	0.19 ± 0.10	0.11 ± 0.09	
	$Z \rightarrow \nu \nu$	1.06 ± 0.03	0.29 ± 0.01	0.08 ± 0.01	0.03 ± 0.00	0.01 ± 0.00	
	Inclusve	3.67 ± 0.53	1.72 ± 0.29	0.28 ± 0.19	0.17 ± 0.10	0.10 ± 0.09	
	1 lepton	0.05 ± 0.07	0.03 ± 0.02	0.05 ± 0.03	_	_	
$tar{t}+W$	1 lepton, from W	0.06 ± 0.06	0.02 ± 0.02	0.02 ± 0.02	_	_	
	1 lepton, from t	-0.01 ± 0.04	0.01 ± 0.01	0.03 ± 0.02			
	≥ 2 leptons	3.62 ± 0.53	1.68 ± 0.28	0.23 ± 0.19	0.17 ± 0.10	0.10 ± 0.09	
	$Z \rightarrow \nu \nu$						
	Inclusve	3.32 ± 0.50	1.48 ± 0.27	0.14 ± 0.17	0.10 ± 0.09	0.12 ± 0.07	
	1 lepton	0.06 ± 0.06	0.02 ± 0.02	0.02 ± 0.02	_	_	
$t\bar{t} + W \rightarrow \ell\nu$, amenlo pythia8	1 lepton, from W	0.06 ± 0.06	0.02 ± 0.02	0.02 ± 0.02	_	_	
* **	1 lepton, from t	3 27 ± 0 40	1 45 ± 0 27	0.12 ± 0.17	0.10 ± 0.00	0.10 ± 0.07	
	$\geq 2 \text{ leptons}$ $Z \rightarrow \nu \nu$	3.27 ± 0.49	1.45 ± 0.27	0.12 ± 0.17	0.10 ± 0.09	0.12 ± 0.07	
	$Z \rightarrow \nu \nu$		_	_		_	
					Continu	ed on next page	

Table 12 - continued from previous page

Table 12 – continued from previous page						
Sample		≥4jets	≥4jets	≥4jets	≥4jets	≥4jets
	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	0.34 ± 0.19	0.24 ± 0.09	0.14 ± 0.08	0.06 ± 0.04	-0.02 ± 0.06
$t\bar{t} + W \rightarrow QQ$, amenlo pythia8	1 lepton	-0.01 ± 0.13	0.01 ± 0.01	0.03 ± 0.02	0.00 ± 0.04	-0.02 ± 0.00
	1 lepton, from W	-0.01 ± 0.04	0.01 ± 0.01	0.03 ± 0.02		
	1 lepton, from t	-0.01 + 0.04	0.01 ± 0.01	0.03 ± 0.02		_
	> 2 leptons	0.35 ± 0.19	0.01 ± 0.01 0.23 ± 0.09	0.03 ± 0.02 0.11 ± 0.08	0.06 ± 0.04	-0.02 ± 0.06
	$Z \rightarrow \nu \nu$	0.33 ± 0.19	0.23 ± 0.09	0.11 ± 0.08	0.00 ± 0.04	-0.02 ± 0.00
		$\frac{-}{2.26 + 0.04}$		$-$ 0.16 \pm 0.01	$ 0.06 \pm 0.01$	
$tar{t}+Z$	Inclusve		0.59 ± 0.02			0.02 ± 0.00
	1 lepton	0.04 ± 0.01	0.01 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	_
	1 lepton, from W	l 	l 			_
	1 lepton, from t	0.04 ± 0.01	0.01 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	
	≥ 2 leptons	1.15 ± 0.03	0.29 ± 0.01	0.08 ± 0.01	0.03 ± 0.00	0.01 ± 0.00
	$Z \rightarrow \nu \nu$	1.06 ± 0.03	0.29 ± 0.01	0.08 ± 0.01	0.03 ± 0.00	0.01 ± 0.00
$tar{t} + Z, ext{ madgraph}$	Inclusve	2.26 ± 0.04	0.59 ± 0.02	0.16 ± 0.01	0.06 ± 0.01	0.02 ± 0.00
	1 lepton	0.04 ± 0.01	0.01 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	_
	1 lepton, from W	_	-	-	-	_
	1 lepton, from t	0.04 ± 0.01	0.01 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	_
	≥ 2 leptons	1.15 ± 0.03	0.29 ± 0.01	0.08 ± 0.01	0.03 ± 0.00	0.01 ± 0.00
	$Z \rightarrow \nu \nu$	1.06 ± 0.03	0.29 ± 0.01	0.08 ± 0.01	0.03 ± 0.00	0.01 ± 0.00
$tar{t} + Z \rightarrow QQ$, amc nlo pythia 8	Inclusve	0.66 ± 0.24	0.32 ± 0.17	0.01 ± 0.03	-0.01 ± 0.03	0.03 ± 0.02
	1 lepton	0.06 ± 0.07	-0.01 ± 0.04	_	_	
	1 lepton, from W	_	_	_	_	
	1 lepton, from t	0.06 ± 0.07	-0.01 ± 0.04	_	_	_
	> 2 leptons	0.60 ± 0.23	0.33 ± 0.16	0.01 ± 0.03	-0.01 ± 0.03	0.03 ± 0.02
	$Z \rightarrow \nu \nu$	_	_	_	_	
$tar{t} + Z { ightarrow} 2\ell 2 u, amenlo pythia 8$	Inclusve	1.33 ± 0.43	0.74 ± 0.25	0.33 ± 0.12	0.06 ± 0.06	0.11 ± 0.04
	1 lepton	_	_	_	_	_
	1 lepton, from W	_	_	_	_	_
	1 lepton, from t	_	_	_	_	_
	> 2 leptons	1.25 ± 0.38	0.59 ± 0.22	0.19 ± 0.10	0.06 ± 0.05	0.05 ± 0.03
	$Z \rightarrow \nu \nu$	0.09 ± 0.19	0.14 ± 0.12	0.14 ± 0.07	-0.00 ± 0.04	0.06 ± 0.03
	1	0.00				0.00