Sample	Classification	2jets modTopness$\geq$ 6.4 $250 < MET < 350$	2jets modTopness$\geq$ 6.4 $350 < MET < 450$	2jets modTopness$\geq$ 6.4 $MET > 450$
Data, single e/μ, MET	Inclusve	107.00 ± 10.34	17.00 ± 4.12	8.00 ± 2.83
All Background	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
	1 lepton, from t	0.59 ± 0.30	—	—
	$\geq$ 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
$t\bar{t}$	Inclusve	57.79 ± 2.05	6.23 ± 0.62	0.49 ± 0.16
	1 lepton	0.59 ± 0.30	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	0.59 ± 0.30	—	—
	$\geq$ 2 leptons	57.20 ± 2.03	6.23 ± 0.62	0.49 ± 0.16
	$Z \rightarrow \nu\nu$	—	—	—
$t\bar{t}$, single lepFromT, madgraph pythia8	Inclusve	0.27 ± 0.27	—	—
	1 lepton	0.27 ± 0.27	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	0.27 ± 0.27	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	Inclusve	0.32 ± 0.14	—	—
	1 lepton	0.32 ± 0.14	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	0.32 ± 0.14	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—
$t\bar{t}$, diLepton, madgraph pythia8, ext1	Inclusve	57.20 ± 2.03	6.23 ± 0.62	0.49 ± 0.16
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	57.20 ± 2.03	6.23 ± 0.62	0.49 ± 0.16
	$Z \rightarrow \nu\nu$	—	—	—
single t	Inclusve	3.65 ± 1.66	0.70 ± 0.70	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	3.65 ± 1.66	0.70 ± 0.70	—
	$Z \rightarrow \nu\nu$	—	—	—
single t $t - W$-channel	Inclusve	3.65 ± 1.66	0.70 ± 0.70	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	3.65 ± 1.66	0.70 ± 0.70	—
	$Z \rightarrow \nu\nu$	—	—	—
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 $\bar{t}$, $t - W$-channel, powheg pythia8	Inclusve	3.65 ± 1.66	0.70 ± 0.70	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	3.65 ± 1.66	0.70 ± 0.70	—
	$Z \rightarrow \nu\nu$	—	—	—
single t non $t - W$-channel	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—

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Table 1 – continued from previous page

Sample	Classification	2jets modTopness≥ 6.4 $250 < MET < 350$	2jets modTopness≥ 6.4 $350 < MET < 450$	2jets modTopness≥ 6.4 $MET > 450$
single t, s-channel, amcnlo pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
V+Jets	Inclusve	17.02 $\pm$ 3.65	4.36 $\pm$ 1.45	2.41 $\pm$ 0.79
	1 lepton	17.02 $\pm$ 3.65	4.36 $\pm$ 1.45	2.41 $\pm$ 0.79
	1 lepton, from W	17.02 $\pm$ 3.65	4.36 $\pm$ 1.45	2.41 $\pm$ 0.79
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
DY+Jets$\to \ell\ell$	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
DY+Jets$\to \ell\ell$, M10to50, amcnlo pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
DY+Jets$\to \ell\ell$, M50, amcnlo pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$	Inclusve	17.02 $\pm$ 3.65	4.36 $\pm$ 1.45	2.41 $\pm$ 0.79
	1 lepton	17.02 $\pm$ 3.65	4.36 $\pm$ 1.45	2.41 $\pm$ 0.79
	1 lepton, from W	17.02 $\pm$ 3.65	4.36 $\pm$ 1.45	2.41 $\pm$ 0.79
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $100 < HT < 200$, madgraph pythia8	Inclusve	2.12 $\pm$ 1.50	—	—
	1 lepton	2.12 $\pm$ 1.50	—	—
	1 lepton, from W	2.12 $\pm$ 1.50	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $200 < HT < 400$, madgraph pythia8	Inclusve	12.62 $\pm$ 3.16	2.80 $\pm$ 1.27	0.76 $\pm$ 0.54
	1 lepton	12.62 $\pm$ 3.16	2.80 $\pm$ 1.27	0.76 $\pm$ 0.54
	1 lepton, from W	12.62 $\pm$ 3.16	2.80 $\pm$ 1.27	0.76 $\pm$ 0.54
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $400 < HT < 600$, madgraph pythia8	Inclusve	0.89 $\pm$ 0.89	0.40 $\pm$ 0.40	0.42 $\pm$ 0.42
	1 lepton	0.89 $\pm$ 0.89	0.40 $\pm$ 0.40	0.42 $\pm$ 0.42
	1 lepton, from W	0.89 $\pm$ 0.89	0.40 $\pm$ 0.40	0.42 $\pm$ 0.42
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $600 < HT < 800$, madgraph pythia8	Inclusve	0.52 $\pm$ 0.26	0.22 $\pm$ 0.13	0.34 $\pm$ 0.16
	1 lepton	0.52 $\pm$ 0.26	0.22 $\pm$ 0.13	0.34 $\pm$ 0.16
	1 lepton, from W	0.52 $\pm$ 0.26	0.22 $\pm$ 0.13	0.34 $\pm$ 0.16
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—

Table 1 – continued from previous page

Sample	Classification	2jets modTopness$\geq$ 6.4 $250 < MET < 350$	2jets modTopness$\geq$ 6.4 $350 < MET < 450$	2jets modTopness$\geq$ 6.4 $MET > 450$
W+Jets$\to \ell\nu$, $800 < HT < 1200$, madgraph pythia8	Inclusve	0.16 $\pm$ 0.08	0.16 $\pm$ 0.08	0.56 $\pm$ 0.15
	1 lepton	0.16 $\pm$ 0.08	0.16 $\pm$ 0.08	0.56 $\pm$ 0.15
	1 lepton, from W	0.16 $\pm$ 0.08	0.16 $\pm$ 0.08	0.56 $\pm$ 0.15
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $1200 < HT < 2500$, madgraph pythia8	Inclusve	0.66 $\pm$ 0.47	0.79 $\pm$ 0.56	0.33 $\pm$ 0.33
	1 lepton	0.66 $\pm$ 0.47	0.79 $\pm$ 0.56	0.33 $\pm$ 0.33
	1 lepton, from W	0.66 $\pm$ 0.47	0.79 $\pm$ 0.56	0.33 $\pm$ 0.33
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $2500 < HT < Inf$, madgraph pythia8	Inclusve	0.05 $\pm$ 0.04	—	0.00 $\pm$ 0.00
	1 lepton	0.05 $\pm$ 0.04	—	0.00 $\pm$ 0.00
	1 lepton, from W	0.05 $\pm$ 0.04	—	0.00 $\pm$ 0.00
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
Rare	Inclusve	10.11 $\pm$ 1.42	2.35 $\pm$ 0.53	1.43 $\pm$ 0.53
	1 lepton	2.83 $\pm$ 1.07	0.17 $\pm$ 0.07	-0.02 $\pm$ 0.03
	1 lepton, from W	2.83 $\pm$ 1.07	0.17 $\pm$ 0.07	-0.02 $\pm$ 0.03
	1 lepton, from t	0.00 $\pm$ 0.00	—	—
	$\geq$ 2 leptons	2.05 $\pm$ 0.55	0.30 $\pm$ 0.17	0.22 $\pm$ 0.13
	$Z \to \nu\nu$	5.23 $\pm$ 0.75	1.87 $\pm$ 0.50	1.23 $\pm$ 0.51
diBoson	Inclusve	7.83 $\pm$ 1.41	1.88 $\pm$ 0.53	1.18 $\pm$ 0.53
	1 lepton	2.83 $\pm$ 1.07	0.17 $\pm$ 0.07	-0.02 $\pm$ 0.03
	1 lepton, from W	2.83 $\pm$ 1.07	0.17 $\pm$ 0.07	-0.02 $\pm$ 0.03
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	1.63 $\pm$ 0.54	0.29 $\pm$ 0.17	0.20 $\pm$ 0.12
	$Z \to \nu\nu$	3.36 $\pm$ 0.75	1.42 $\pm$ 0.50	1.00 $\pm$ 0.51
WW	Inclusve	3.93 $\pm$ 1.19	0.20 $\pm$ 0.14	0.08 $\pm$ 0.08
	1 lepton	2.38 $\pm$ 1.07	—	—
	1 lepton, from W	2.38 $\pm$ 1.07	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	1.55 $\pm$ 0.54	0.20 $\pm$ 0.14	0.08 $\pm$ 0.08
	$Z \to \nu\nu$	—	—	—
$WW \to 2\ell 2\nu$, powheg	Inclusve	1.55 $\pm$ 0.54	0.20 $\pm$ 0.14	0.08 $\pm$ 0.08
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	1.55 $\pm$ 0.54	0.20 $\pm$ 0.14	0.08 $\pm$ 0.08
	$Z \to \nu\nu$	—	—	—
$WW \to \ell\nu qq$, powheg	Inclusve	2.38 $\pm$ 1.07	—	—
	1 lepton	2.38 $\pm$ 1.07	—	—
	1 lepton, from W	2.38 $\pm$ 1.07	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
WZ	Inclusve	3.73 $\pm$ 0.76	1.65 $\pm$ 0.51	1.07 $\pm$ 0.52
	1 lepton	0.45 $\pm$ 0.13	0.17 $\pm$ 0.07	-0.02 $\pm$ 0.03
	1 lepton, from W	0.45 $\pm$ 0.13	0.17 $\pm$ 0.07	-0.02 $\pm$ 0.03
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.08 $\pm$ 0.04	0.09 $\pm$ 0.09	0.12 $\pm$ 0.09
	$Z \to \nu\nu$	3.20 $\pm$ 0.75	1.39 $\pm$ 0.50	0.96 $\pm$ 0.51
$WZ \to 3\ell\nu$, powheg pythia8	Inclusve	0.04 $\pm$ 0.04	0.09 $\pm$ 0.09	0.11 $\pm$ 0.09
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.04 $\pm$ 0.04	0.09 $\pm$ 0.09	0.11 $\pm$ 0.09
	$Z \to \nu\nu$	—	—	—

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Table 1 – continued from previous page

Sample	Classification	2jets modTopness$\geq$ 6.4 $250 < MET < 350$	2jets modTopness$\geq$ 6.4 $350 < MET < 450$	2jets modTopness$\geq$ 6.4 $MET > 450$
$WZ \to 2\ell2Q$, amcnlo pythia8	Inclusve	0.04 ± 0.02	—	0.01 ± 0.01
	1 lepton	—		—
	1 lepton, from W	—		—
	1 lepton, from t	—		—
	$\geq$ 2 leptons	0.04 ± 0.02		0.01 ± 0.01
	$Z \to \nu\nu$	—		—
$WZ \to \ell\nu2Q$, amcnlo pythia8	Inclusve	0.45 ± 0.13	0.17 ± 0.07	-0.02 ± 0.03
	1 lepton	0.45 ± 0.13	0.17 ± 0.07	-0.02 ± 0.03
	1 lepton, from W	0.45 ± 0.13	0.17 ± 0.07	-0.02 ± 0.03
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
$WZ \to 1\ell3\nu$, amcnlo pythia8	Inclusve	3.20 ± 0.75	1.39 ± 0.50	0.96 ± 0.51
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	3.20 ± 0.75	1.39 ± 0.50	0.96 ± 0.51
ZZ	Inclusve	0.16 ± 0.02	0.03 ± 0.01	0.04 ± 0.01
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	0.16 ± 0.02	0.03 ± 0.01	0.04 ± 0.01
$ZZ \to 2\ell2Q$, amcnlo pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
$ZZ \to 2\ell2\nu$, powheg pythia8	Inclusve	0.13 ± 0.02	0.04 ± 0.01	0.03 ± 0.01
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	0.13 ± 0.02	0.04 ± 0.01	0.03 ± 0.01
$ZZ \to 2Q2\nu$, amcnlo pythia8	Inclusve	0.03 ± 0.01	-0.01 ± 0.01	0.01 ± 0.01
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	0.03 ± 0.01	-0.01 ± 0.01	0.01 ± 0.01
$t\bar{t} + V$	Inclusve	2.28 ± 0.12	0.46 ± 0.02	0.25 ± 0.04
	1 lepton	0.00 ± 0.00	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	0.00 ± 0.00	—	—
	$\geq$ 2 leptons	0.41 ± 0.11	0.02 ± 0.01	0.02 ± 0.04
	$Z \to \nu\nu$	1.87 ± 0.04	0.45 ± 0.02	0.23 ± 0.01
$t\bar{t} + W$	Inclusve	0.41 ± 0.11	0.01 ± 0.01	0.02 ± 0.04
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.41 ± 0.11	0.01 ± 0.01	0.02 ± 0.04
	$Z \to \nu\nu$	—	—	—
$t\bar{t} + W \to \ell\nu$, amcnlo pythia8	Inclusve	0.32 ± 0.11	—	0.02 ± 0.04
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.32 ± 0.11	—	0.02 ± 0.04
	$Z \to \nu\nu$	—	—	—

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Table 1 – continued from previous page

Sample	Classification	2jets modTopness≥ 6.4 $250 < MET < 350$	2jets modTopness≥ 6.4 $350 < MET < 450$	2jets modTopness≥ 6.4 $MET > 450$
$t\bar{t} + W \to QQ$, amcnlo pythia8	Inclusve	0.08 ± 0.04	0.01 ± 0.01	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.08 ± 0.04	0.01 ± 0.01	—
	$Z \to \nu\nu$	—	—	—
$t\bar{t} + Z$	Inclusve	1.88 ± 0.04	0.45 ± 0.02	0.23 ± 0.01
	1 lepton	0.00 ± 0.00	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	0.00 ± 0.00	—	—
	$\geq$ 2 leptons	0.01 ± 0.00	0.00 ± 0.00	—
	$Z \to \nu\nu$	1.87 ± 0.04	0.45 ± 0.02	0.23 ± 0.01
$t\bar{t} + Z$, madgraph	Inclusve	1.88 ± 0.04	0.45 ± 0.02	0.23 ± 0.01
	1 lepton	0.00 ± 0.00	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	0.00 ± 0.00	—	—
	$\geq$ 2 leptons	0.01 ± 0.00	0.00 ± 0.00	—
	$Z \to \nu\nu$	1.87 ± 0.04	0.45 ± 0.02	0.23 ± 0.01
$t\bar{t} + Z \to QQ$, amcnlo pythia8	Inclusve	0.08 ± 0.07	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.08 ± 0.07	—	—
	$Z \to \nu\nu$	—	—	—
$t\bar{t} + Z \to 2\ell 2\nu$, amcnlo pythia8	Inclusve	1.77 ± 0.26	0.76 ± 0.17	0.27 ± 0.08
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	-0.00 ± 0.03	0.09 ± 0.09	—
	$Z \to \nu\nu$	1.77 ± 0.26	0.66 ± 0.14	0.27 ± 0.08

Sample	Classification	3jets MT2W≥200 $250 < MET < 350$	3jets MT2W≥200 $350 < MET < 450$	3jets MT2W≥200 $450 < MET < 550$	3jets MT2W≥200 $MET > 550$
Data, single e/μ, MET	Inclusve	63.00 ± 7.94	15.00 ± 3.87	9.00 ± 3.00	4.00 ± 2.00
All Background	Inclusve	74.05 ± 4.96	14.01 ± 1.84	5.64 ± 1.13	2.81 ± 0.96
	1 lepton	23.93 ± 3.98	5.12 ± 1.47	2.44 ± 0.87	2.00 ± 0.92
	1 lepton, from W	23.70 ± 3.97	5.12 ± 1.47	2.44 ± 0.87	2.00 ± 0.92
	1 lepton, from t	0.23 ± 0.13	0.00 ± 0.00	0.00 ± 0.00	—
	≥ 2 leptons	44.16 ± 2.89	6.77 ± 1.00	1.59 ± 0.60	0.42 ± 0.16
	$Z \to \nu\nu$	5.97 ± 0.63	2.12 ± 0.48	1.61 ± 0.40	0.39 ± 0.22
$t\bar{t}$	Inclusve	36.05 ± 1.81	5.30 ± 0.63	0.99 ± 0.38	0.28 ± 0.11
	1 lepton	0.23 ± 0.13	—	—	—
	1 lepton, from W	—	—	—	—
	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
	$Z \to \nu\nu$	—	—	—	—
$t\bar{t}$, single lepFromT, madgraph pythia8	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	Inclusve	0.23 ± 0.13	—	—	—
	1 lepton	0.23 ± 0.13	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	0.23 ± 0.13	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
$t\bar{t}$, diLepton, madgraph pythia8, ext1	Inclusve	35.82 ± 1.81	5.30 ± 0.63	0.99 ± 0.38	0.28 ± 0.11
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	35.82 ± 1.81	5.30 ± 0.63	0.99 ± 0.38	0.28 ± 0.11
	$Z \to \nu\nu$	—	—	—	—
single t	Inclusve	7.06 ± 2.32	1.05 ± 0.74	0.38 ± 0.38	—
	1 lepton	0.70 ± 0.70	—	—	—
	1 lepton, from W	0.70 ± 0.70	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	6.36 ± 2.21	1.05 ± 0.74	0.38 ± 0.38	—
	$Z \to \nu\nu$	—	—	—	—
single t $t - W$-channel	Inclusve	7.06 ± 2.32	1.05 ± 0.74	0.38 ± 0.38	—
	1 lepton	0.70 ± 0.70	—	—	—
	1 lepton, from W	0.70 ± 0.70	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	6.36 ± 2.21	1.05 ± 0.74	0.38 ± 0.38	—
	$Z \to \nu\nu$	—	—	—	—
single t, $t - W$-channel, powheg pythia8	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
single $\bar{t}$, $t - W$-channel, powheg pythia8	Inclusve	7.06 ± 2.32	1.05 ± 0.74	0.38 ± 0.38	—
	1 lepton	0.70 ± 0.70	—	—	—
	1 lepton, from W	0.70 ± 0.70	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	6.36 ± 2.21	1.05 ± 0.74	0.38 ± 0.38	—
	$Z \to \nu\nu$	—	—	—	—
single t non $t - W$-channel	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—

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Table 2 – continued from previous page

Sample	Classification	3jets MT2W≥200 $250 < MET < 350$	3jets MT2W≥200 $350 < MET < 450$	3jets MT2W≥200 $450 < MET < 550$	3jets MT2W≥200 $MET > 550$
single t, s-channel, amcnlo pythia8	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—	—
V+Jets	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
	1 lepton, from W	21.46 ± 3.84	4.84 ± 1.47	2.02 ± 0.78	1.88 ± 0.92
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—	—
DY+Jets$\rightarrow \ell\ell$	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—	—
DY+Jets$\rightarrow \ell\ell$, M10to50, amcnlo pythia8	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—	—
DY+Jets$\rightarrow \ell\ell$, M50, amcnlo pythia8	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—	—
W+Jets$\rightarrow \ell\nu$	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
	1 lepton, from W	21.46 ± 3.84	4.84 ± 1.47	2.02 ± 0.78	1.88 ± 0.92
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—	—
W+Jets$\rightarrow \ell\nu$, $100 < HT < 200$, madgraph pythia8	Inclusve	1.11 ± 1.11	—	—	0.70 ± 0.70
	1 lepton	1.11 ± 1.11	—	—	0.70 ± 0.70
	1 lepton, from W	1.11 ± 1.11	—	—	0.70 ± 0.70
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—	—
W+Jets$\rightarrow \ell\nu$, $200 < HT < 400$, madgraph pythia8	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	0.55 ± 0.55
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—	—
W+Jets$\rightarrow \ell\nu$, $400 < HT < 600$, madgraph pythia8	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	—
	1 lepton, from W	8.45 ± 2.81	1.70 ± 1.00	0.43 ± 0.43	—
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—	—
W+Jets$\rightarrow \ell\nu$, $600 < HT < 800$, madgraph pythia8	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
	1 lepton, from W	1.49 ± 0.48	1.02 ± 0.28	0.45 ± 0.25	0.27 ± 0.19
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—	—

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Table 2 – continued from previous page

Sample	Classification	3jets MT2W≥200 $250 < MET < 350$	3jets MT2W≥200 $350 < MET < 450$	3jets MT2W≥200 $450 < MET < 550$	3jets MT2W≥200 $MET > 550$
W+Jets→ $\ell\nu$, $800 < HT < 1200$, madgraph pythia8	Inclusve	1.58 ± 0.27	0.54 ± 0.14	0.17 ± 0.06	0.28 ± 0.07
	1 lepton	1.58 ± 0.27	0.54 ± 0.14	0.17 ± 0.06	0.28 ± 0.07
	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	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
W+Jets→ $\ell\nu$, $1200 < HT < 2500$, madgraph pythia8	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
	1 lepton, from W	0.98 ± 0.58	0.59 ± 0.42	0.15 ± 0.10	0.06 ± 0.06
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
W+Jets→ $\ell\nu$, $2500 < HT < Inf$, madgraph pythia8	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
	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	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
Rare	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
	1 lepton, from W	1.54 ± 0.76	0.28 ± 0.09	0.42 ± 0.39	0.12 ± 0.04
	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
	$Z \to \nu\nu$	5.97 ± 0.63	2.12 ± 0.48	1.61 ± 0.40	0.39 ± 0.22
diBoson	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	0.25 ± 0.09	0.42 ± 0.39	0.10 ± 0.04
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	1.34 ± 0.44	0.20 ± 0.15	0.26 ± 0.26	0.13 ± 0.11
	$Z \to \nu\nu$	1.90 ± 0.63	0.78 ± 0.48	1.19 ± 0.40	0.16 ± 0.22
WW	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	—
	1 lepton, from W	1.05 ± 0.75	—	0.39 ± 0.39	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	1.26 ± 0.43	0.21 ± 0.15	0.26 ± 0.26	0.10 ± 0.10
	$Z \to \nu\nu$	—	—	—	—
$WW \to 2\ell2\nu$, powheg	Inclusve	1.26 ± 0.43	0.21 ± 0.15	0.26 ± 0.26	0.10 ± 0.10
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	1.26 ± 0.43	0.21 ± 0.15	0.26 ± 0.26	0.10 ± 0.10
	$Z \to \nu\nu$	—	—	—	—
$WW \to \ell\nu qq$, powheg	Inclusve	1.05 ± 0.75	—	0.39 ± 0.39	—
	1 lepton	1.05 ± 0.75	—	0.39 ± 0.39	—
	1 lepton, from W	1.05 ± 0.75	—	0.39 ± 0.39	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
WZ	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
	1 lepton, from W	0.48 ± 0.14	0.25 ± 0.09	0.03 ± 0.04	0.10 ± 0.04
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	0.09 ± 0.07	-0.01 ± 0.01	—	—
	$Z \to \nu\nu$	1.84 ± 0.63	0.73 ± 0.48	1.18 ± 0.40	0.15 ± 0.22
$WZ \to 3\ell\nu$, powheg pythia8	Inclusve	0.10 ± 0.07	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	0.10 ± 0.07	—	—	—
	$Z \to \nu\nu$	—	—	—	—

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Table 2 – continued from previous page

Sample	Classification	3jets MT2W≥200 $250 < MET < 350$	3jets MT2W≥200 $350 < MET < 450$	3jets MT2W≥200 $450 < MET < 550$	3jets MT2W≥200 $MET > 550$
$WZ{\to}2\ell2Q$, amcnlo pythia8	Inclusve	-0.01 ± 0.01	-0.01 ± 0.01	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	-0.01 ± 0.01	-0.01 ± 0.01	—	—
	$Z \to \nu\nu$	—	—	—	—
$WZ{\to}\ell\nu2Q$, amcnlo pythia8	Inclusve	0.48 ± 0.14	0.25 ± 0.09	0.03 ± 0.04	0.10 ± 0.04
	1 lepton	0.48 ± 0.14	0.25 ± 0.09	0.03 ± 0.04	0.10 ± 0.04
	1 lepton, from W	0.48 ± 0.14	0.25 ± 0.09	0.03 ± 0.04	0.10 ± 0.04
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
$WZ{\to}1\ell3\nu$, amcnlo pythia8	Inclusve	1.84 ± 0.63	0.73 ± 0.48	1.18 ± 0.40	0.15 ± 0.22
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	1.84 ± 0.63	0.73 ± 0.48	1.18 ± 0.40	0.15 ± 0.22
ZZ	Inclusve	0.06 ± 0.02	0.05 ± 0.01	0.01 ± 0.00	0.03 ± 0.02
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	-0.01 ± 0.01	—	—	0.02 ± 0.02
	$Z \to \nu\nu$	0.06 ± 0.01	0.05 ± 0.01	0.01 ± 0.00	0.01 ± 0.00
$ZZ{\to}2\ell2Q$, amcnlo pythia8	Inclusve	-0.01 ± 0.01	—	—	0.02 ± 0.02
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	-0.01 ± 0.01	—	—	0.02 ± 0.02
	$Z \to \nu\nu$	—	—	—	—
$ZZ{\to}2\ell2\nu$, powheg pythia8	Inclusve	0.06 ± 0.01	0.04 ± 0.01	0.01 ± 0.00	0.01 ± 0.00
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	0.06 ± 0.01	0.04 ± 0.01	0.01 ± 0.00	0.01 ± 0.00
$ZZ{\to}2Q2\nu$, amcnlo pythia8	Inclusve	0.01 ± 0.01	0.01 ± 0.01	—	0.00 ± 0.00
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	0.01 ± 0.01	0.01 ± 0.01	—	0.00 ± 0.00
$t\bar{t} + V$	Inclusve	4.71 ± 0.21	1.58 ± 0.18	0.38 ± 0.04	0.26 ± 0.03
	1 lepton	0.00 ± 0.00	0.03 ± 0.03	0.00 ± 0.00	0.02 ± 0.02
	1 lepton, from W	—	0.03 ± 0.03	—	0.02 ± 0.02
	1 lepton, from t	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	—
	≥ 2 leptons	0.64 ± 0.20	0.22 ± 0.17	-0.03 ± 0.03	0.02 ± 0.02
	$Z \to \nu\nu$	4.07 ± 0.05	1.33 ± 0.03	0.41 ± 0.02	0.23 ± 0.01
$t\bar{t} + W$	Inclusve	0.61 ± 0.20	0.24 ± 0.17	-0.03 ± 0.03	0.03 ± 0.02
	1 lepton	—	0.03 ± 0.03	—	0.02 ± 0.02
	1 lepton, from W	—	0.03 ± 0.03	—	0.02 ± 0.02
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	0.61 ± 0.20	0.22 ± 0.17	-0.03 ± 0.03	0.02 ± 0.02
	$Z \to \nu\nu$	—	—	—	—
$t\bar{t} + W{\to}\ell\nu$, amcnlo pythia8	Inclusve	0.50 ± 0.18	0.23 ± 0.17	-0.03 ± 0.03	0.03 ± 0.02
	1 lepton	—	0.03 ± 0.03	—	0.02 ± 0.02
	1 lepton, from W	—	0.03 ± 0.03	—	0.02 ± 0.02
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	0.50 ± 0.18	0.20 ± 0.17	-0.03 ± 0.03	0.02 ± 0.02
	$Z \to \nu\nu$	—	—	—	—

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Table 2 – continued from previous page

Sample	Classification	3jets MT2W≥200 250 < MET < 350	3jets MT2W≥200 350 < MET < 450	3jets MT2W≥200 450 < MET < 550	3jets MT2W≥200 MET > 550
$t\bar{t} + W {\to} QQ$, amcnlo pythia8	Inclusve	0.11 ± 0.10	0.02 ± 0.02	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	0.11 ± 0.10	0.02 ± 0.02	—	—
	$Z \to \nu\nu$	—	—	—	—
$t\bar{t} + Z$	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	—
	1 lepton, from W	—	—	—	—
	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	—
	$Z \to \nu\nu$	4.07 ± 0.05	1.33 ± 0.03	0.41 ± 0.02	0.23 ± 0.01
$t\bar{t} + Z$, madgraph	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	—
	1 lepton, from W	—	—	—	—
	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	—
	$Z \to \nu\nu$	4.07 ± 0.05	1.33 ± 0.03	0.41 ± 0.02	0.23 ± 0.01
$t\bar{t} + Z {\to} QQ$, amcnlo pythia8	Inclusve	0.04 ± 0.08	0.02 ± 0.02	0.02 ± 0.02	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	0.04 ± 0.08	0.02 ± 0.02	0.02 ± 0.02	—
	$Z \to \nu\nu$	—	—	—	—
$t\bar{t} + Z {\to} 2\ell 2\nu$, amcnlo pythia8	Inclusve	3.05 ± 0.42	1.40 ± 0.23	0.48 ± 0.12	0.27 ± 0.07
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	3.05 ± 0.42	1.40 ± 0.23	0.48 ± 0.12	0.27 ± 0.07

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Sample	Classification	≥4jets MT2W< 200 250 < MET < 350	≥4jets MT2W< 200 350 < MET < 450	≥4jets MT2W< 200 MET > 450
Data, single e/μ, MET	Inclusve	188.00 ± 13.71	43.00 ± 6.56	17.00 ± 4.12
All Background	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
	1 lepton, from W	9.64 ± 2.22	1.71 ± 0.71	0.30 ± 0.10
	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
	$Z \to \nu\nu$	7.57 ± 0.46	1.69 ± 0.22	0.33 ± 0.09
$t\bar{t}$	Inclusve	292.70 ± 5.28	45.06 ± 1.94	12.17 ± 0.92
	1 lepton	8.17 ± 1.27	1.51 ± 0.57	0.44 ± 0.22
	1 lepton, from W	—	—	—
	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 ± 0.89
	$Z \to \nu\nu$			
$t\bar{t}$, single lepFromT, madgraph pythia8	Inclusve	3.24 ± 1.10	1.08 ± 0.54	0.19 ± 0.19
	1 lepton	3.24 ± 1.10	1.08 ± 0.54	0.19 ± 0.19
	1 lepton, from W	—	—	—
	1 lepton, from t	3.24 ± 1.10	1.08 ± 0.54	0.19 ± 0.19
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	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
	1 lepton, from W	—	—	—
	1 lepton, from t	4.93 ± 0.63	0.43 ± 0.18	0.25 ± 0.11
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
$t\bar{t}$, diLepton, madgraph pythia8, ext1	Inclusve	284.53 ± 5.13	43.54 ± 1.86	11.72 ± 0.89
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	284.53 ± 5.13	43.54 ± 1.86	11.72 ± 0.89
	$Z \to \nu\nu$	—	—	—
single t	Inclusve	4.68 ± 1.76	—	—
	1 lepton	1.73 ± 0.95	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	1.73 ± 0.95	—	—
	≥ 2 leptons	2.95 ± 1.48	—	—
	$Z \to \nu\nu$	—	—	—
single t $t - W$-channel	Inclusve	4.58 ± 1.75	—	—
	1 lepton	1.63 ± 0.95	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	1.63 ± 0.95	—	—
	≥ 2 leptons	2.95 ± 1.48	—	—
	$Z \to \nu\nu$	—	—	—
single t, $t - W$-channel, powheg pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
single $\bar{t}$, $t - W$-channel, powheg pythia8	Inclusve	4.58 ± 1.75	—	—
	1 lepton	1.63 ± 0.95	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	1.63 ± 0.95	—	—
	≥ 2 leptons	2.95 ± 1.48	—	—
	$Z \to \nu\nu$	—	—	—
single t non $t - W$-channel	Inclusve	0.10 ± 0.10	—	—
	1 lepton	0.10 ± 0.10	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	0.10 ± 0.10	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—

Table 3 – continued from previous page

Sample	Classification	$\geq$4jets MT2W$<$ 200 $250 < MET < 350$	$\geq$4jets MT2W$<$ 200 $350 < MET < 450$	$\geq$4jets MT2W$<$ 200 $MET > 450$
single t, s-channel, amcnlo pythia8	Inclusve	0.10 ± 0.10	—	—
	1 lepton	0.10 ± 0.10	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	0.10 ± 0.10	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
V+Jets	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
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
DY+Jets$\to \ell\ell$	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
DY+Jets$\to \ell\ell$, M10to50, amcnlo pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
DY+Jets$\to \ell\ell$, M50, amcnlo pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$	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
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $100 < HT < 200$, madgraph pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $200 < HT < 400$, madgraph pythia8	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	0.48 ± 0.48	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $400 < HT < 600$, madgraph pythia8	Inclusve	3.76 ± 1.69	0.48 ± 0.48	—
	1 lepton	3.76 ± 1.69	0.48 ± 0.48	—
	1 lepton, from W	3.76 ± 1.69	0.48 ± 0.48	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $600 < HT < 800$, madgraph pythia8	Inclusve	0.42 ± 0.17	0.53 ± 0.21	0.08 ± 0.08
	1 lepton	0.42 ± 0.17	0.53 ± 0.21	0.08 ± 0.08
	1 lepton, from W	0.42 ± 0.17	0.53 ± 0.21	0.08 ± 0.08
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—

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Table 3 – continued from previous page

Sample	Classification	>4jets MT2W< 200 250 < MET < 350	>4jets MT2W< 200 350 < MET < 450	>4jets MT2W< 200 MET > 450
W+Jets→ $\ell\nu$, 800 < HT < 1200, madgraph pythia8	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
	1 lepton, from W	1.08 ± 0.17	0.15 ± 0.06	0.18 ± 0.05
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets→ $\ell\nu$, 1200 < HT < 2500, madgraph pythia8	Inclusve	1.36 ± 0.49	—	—
	1 lepton	1.36 ± 0.49	—	—
	1 lepton, from W	1.36 ± 0.49	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets→ $\ell\nu$, 2500 < HT < Inf, madgraph pythia8	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
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
Rare	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
	1 lepton, from W	0.97 ± 0.59	0.06 ± 0.05	0.03 ± 0.04
	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
	$Z \to \nu\nu$	7.57 ± 0.46	1.69 ± 0.22	0.33 ± 0.09
diBoson	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
	1 lepton, from W	0.92 ± 0.59	0.06 ± 0.05	0.03 ± 0.04
	1 lepton, from t	—	—	—
	≥ 2 leptons	0.61 ± 0.30	—	—
	$Z \to \nu\nu$	0.91 ± 0.45	0.41 ± 0.22	0.02 ± 0.09
WW	Inclusve	1.08 ± 0.65	—	—
	1 lepton	0.58 ± 0.58	—	—
	1 lepton, from W	0.58 ± 0.58	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	0.50 ± 0.29	—	—
	$Z \to \nu\nu$	—	—	—
WW→2ℓ2ν, powheg	Inclusve	0.50 ± 0.29	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	0.50 ± 0.29	—	—
	$Z \to \nu\nu$	—	—	—
WW→$\ell\nu qq$, powheg	Inclusve	0.58 ± 0.58	—	—
	1 lepton	0.58 ± 0.58	—	—
	1 lepton, from W	0.58 ± 0.58	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
WZ	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
	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	—	—
	$Z \to \nu\nu$	0.88 ± 0.45	0.39 ± 0.22	0.01 ± 0.09
WZ→3$\ell\nu$, powheg pythia8	Inclusve	0.11 ± 0.08	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	0.11 ± 0.08	—	—
	$Z \to \nu\nu$	—	—	—

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Table 3 – continued from previous page

Sample	Classification	≥4jets MT2W< 200 250 < MET < 350	≥4jets MT2W< 200 350 < MET < 450	≥4jets MT2W< 200 MET > 450
	Inclusve	0.00 ± 0.01	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
$WZ{\rightarrow}2\ell2Q$, amcnlo pythia8	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
	1 lepton, from W	0.34 ± 0.11	0.06 ± 0.05	0.03 ± 0.04
$WZ{\rightarrow}\ell\nu2Q$, amcnlo pythia8	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	—	—	—
	1 lepton, from W	—	—	—
$WZ{\rightarrow}1\ell3\nu$, 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	—	—	—
	1 lepton, from W	—	—	—
$ZZ{\rightarrow}2\ell2Q$, 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	—	—	—
	1 lepton, from W	—	—	—
$ZZ{\rightarrow}2\ell2\nu$, powheg pythia8	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	—	—	—
	1 lepton, from W	—	—	—
$ZZ{\rightarrow}2Q2\nu$, amcnlo pythia8	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \rightarrow \nu\nu$	-0.00 ± 0.02	0.00 ± 0.00	—
	Inclusve	8.78 ± 0.47	1.71 ± 0.20	0.61 ± 0.12
	1 lepton	0.09 ± 0.05	0.02 ± 0.01	0.02 ± 0.02
	1 lepton, from W	0.05 ± 0.03	—	—
$t\bar{t} + V$	1 lepton, from t	0.05 ± 0.04	0.02 ± 0.01	0.02 ± 0.02
	≥ 2 leptons	2.02 ± 0.46	0.40 ± 0.20	0.28 ± 0.12
	$Z \rightarrow \nu\nu$	6.66 ± 0.07	1.29 ± 0.03	0.32 ± 0.01
	Inclusve	1.99 ± 0.47	0.40 ± 0.20	0.29 ± 0.12
	1 lepton	0.06 ± 0.05	0.01 ± 0.01	0.02 ± 0.02
	1 lepton, from W	0.05 ± 0.03	—	—
$t\bar{t} + W$	1 lepton, from t	0.01 ± 0.04	0.01 ± 0.01	0.02 ± 0.02
	≥ 2 leptons	1.93 ± 0.46	0.39 ± 0.20	0.27 ± 0.12
	$Z \rightarrow \nu\nu$	—	—	—
	Inclusve	1.32 ± 0.43	0.23 ± 0.18	0.19 ± 0.11
	1 lepton	0.05 ± 0.03	—	—
	1 lepton, from W	0.05 ± 0.03	—	—
$t\bar{t} + W{\rightarrow}\ell\nu$, amcnlo pythia8	1 lepton, from t	—	—	—
	≥ 2 leptons	1.27 ± 0.43	0.23 ± 0.18	0.19 ± 0.11
	$Z \rightarrow \nu\nu$	—	—	—

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Table 3 – continued from previous page

Sample	Classification	≥4jets MT2W< 200 250 < MET < 350	≥4jets MT2W< 200 350 < MET < 450	≥4jets MT2W< 200 MET > 450
$t\bar{t} + W \to QQ$, amcnlo pythia8	Inclusve	0.66 ± 0.19	0.16 ± 0.09	0.10 ± 0.05
	1 lepton	0.01 ± 0.04	0.01 ± 0.01	0.02 ± 0.02
	1 lepton, from W	—	—	—
	1 lepton, from t	0.01 ± 0.04	0.01 ± 0.01	0.02 ± 0.02
	≥ 2 leptons	0.65 ± 0.18	0.15 ± 0.08	0.09 ± 0.05
	$Z \to \nu\nu$	—	—	—
$t\bar{t} + Z$	Inclusve	6.79 ± 0.07	1.31 ± 0.03	0.33 ± 0.01
	1 lepton	0.03 ± 0.00	0.01 ± 0.00	—
	1 lepton, from W	—	—	—
	1 lepton, from t	0.03 ± 0.00	0.01 ± 0.00	—
	≥ 2 leptons	0.09 ± 0.01	0.02 ± 0.00	0.01 ± 0.00
	$Z \to \nu\nu$	6.66 ± 0.07	1.29 ± 0.03	0.32 ± 0.01
$t\bar{t} + Z$, madgraph	Inclusve	6.79 ± 0.07	1.31 ± 0.03	0.33 ± 0.01
	1 lepton	0.03 ± 0.00	0.01 ± 0.00	—
	1 lepton, from W	—	—	—
	1 lepton, from t	0.03 ± 0.00	0.01 ± 0.00	—
	≥ 2 leptons	0.09 ± 0.01	0.02 ± 0.00	0.01 ± 0.00
	$Z \to \nu\nu$	6.66 ± 0.07	1.29 ± 0.03	0.32 ± 0.01
$t\bar{t} + Z \to QQ$, amcnlo pythia8	Inclusve	0.67 ± 0.32	0.33 ± 0.13	0.03 ± 0.07
	1 lepton	0.05 ± 0.06	—	-0.03 ± 0.03
	1 lepton, from W	—	—	—
	1 lepton, from t	0.05 ± 0.06	—	-0.03 ± 0.03
	≥ 2 leptons	0.62 ± 0.31	0.33 ± 0.13	0.06 ± 0.06
	$Z \to \nu\nu$	—	—	—
$t\bar{t} + Z \to 2\ell2\nu$, amcnlo pythia8	Inclusve	7.08 ± 0.71	1.52 ± 0.34	0.75 ± 0.18
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	0.40 ± 0.14	-0.15 ± 0.11	0.01 ± 0.01
	$Z \to \nu\nu$	6.67 ± 0.70	1.66 ± 0.32	0.74 ± 0.18

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SR, Nominal Systematic, Yield Table for Input Samples

Sample	Classification	≥4jets MT2W≥ 200 $250 < MET < 350$	≥4jets MT2W≥ 200 $350 < MET < 450$	≥4jets MT2W≥ 200 $450 < MET < 550$	≥4jets MT2W≥ 200 $550 < MET < 650$	≥4jets MT2W≥ 200 $MET > 650$
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
All Background	Inclusve	86.78 ± 4.26	29.00 ± 2.17	9.67 ± 1.53	2.87 ± 0.78	2.43 ± 0.54
	1 lepton	20.70 ± 2.92	8.19 ± 1.52	3.26 ± 1.01	0.77 ± 0.29	1.33 ± 0.37
	1 lepton, from W	16.30 ± 2.80	6.32 ± 1.39	3.21 ± 1.01	0.77 ± 0.29	1.16 ± 0.36
	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
	$Z \to \nu\nu$	6.81 ± 0.46	4.45 ± 0.55	1.46 ± 0.39	0.59 ± 0.23	0.21 ± 0.19
$t\bar{t}$	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
	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
	$Z \to \nu\nu$					
$t\bar{t}$, single lepFromT, madgraph pythia8	Inclusve	1.62 ± 0.68	1.01 ± 0.52	—	—	—
	1 lepton	1.62 ± 0.68	1.01 ± 0.52	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	1.62 ± 0.68	1.01 ± 0.52	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	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
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	2.71 ± 0.49	0.85 ± 0.35	0.05 ± 0.05	—	0.17 ± 0.09
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
$t\bar{t}$, diLepton, madgraph pythia8, ext1	Inclusve	51.65 ± 2.33	15.08 ± 1.32	3.77 ± 0.64	0.78 ± 0.27	0.46 ± 0.20
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	51.65 ± 2.33	15.08 ± 1.32	3.77 ± 0.64	0.78 ± 0.27	0.46 ± 0.20
	$Z \to \nu\nu$	—	—	—	—	—
single t	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	—	—	—
	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
	$Z \to \nu\nu$	—	—	—	—	—
single t $t − W$-channel	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	—	—	—
	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
	$Z \to \nu\nu$	—	—	—	—	—
single t, $t − W$-channel, powheg pythia8	Inclusve	—	—	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
single $\bar{t}$, $t − W$-channel, powheg pythia8	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	—	—	—
	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
	$Z \to \nu\nu$	—	—	—	—	—
single t non $t − W$-channel	Inclusve	—	—	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—

Table 4 – continued from previous page

Sample	Classification	≥4jets MT2W≥ 200 250 < MET < 350	≥4jets MT2W≥ 200 350 < MET < 450	≥4jets MT2W≥ 200 450 < MET < 550	≥4jets MT2W≥ 200 550 < MET < 650	≥4jets MT2W≥ 200 MET > 650
single t, s-channel, amcnlo pythia8	Inclusve	—	—	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
V+Jets	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
	1 lepton, from W	14.43 ± 2.62	5.42 ± 1.19	3.12 ± 1.01	0.74 ± 0.28	1.17 ± 0.36
	1 lepton, from t	—	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
DY+Jets→ $\ell\ell$	Inclusve	—	—	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
DY+Jets→ $\ell\ell$, M10to50, amcnlo pythia8	Inclusve	—	—	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
DY+Jets→ $\ell\ell$, M50, amcnlo pythia8	Inclusve	—	—	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$	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
	1 lepton, from W	14.43 ± 2.62	5.42 ± 1.19	3.12 ± 1.01	0.74 ± 0.28	1.17 ± 0.36
	1 lepton, from t	—	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$, 100 < HT < 200, madgraph pythia8	Inclusve	1.46 ± 1.46	—	—	—	—
	1 lepton	1.46 ± 1.46	—	—	—	—
	1 lepton, from W	1.46 ± 1.46	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$, 200 < HT < 400, madgraph pythia8	Inclusve	3.12 ± 1.42	—	0.61 ± 0.61	—	—
	1 lepton	3.12 ± 1.42	—	0.61 ± 0.61	—	—
	1 lepton, from W	3.12 ± 1.42	—	0.61 ± 0.61	—	—
	1 lepton, from t	—	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$, 400 < HT < 600, madgraph pythia8	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	—	—
	1 lepton, from t	—	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$, 600 < HT < 800, madgraph pythia8	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	1.70 ± 0.50	0.76 ± 0.32	0.06 ± 0.06	0.28 ± 0.14
	1 lepton, from W	2.27 ± 0.51	1.70 ± 0.50	0.76 ± 0.32	0.06 ± 0.06	0.28 ± 0.14
	1 lepton, from t	—	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—

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Table 4 – continued from previous page

Sample	Classification	≥4jets MT2W≥ 200 250 < MET < 350	≥4jets MT2W≥ 200 350 < MET < 450	≥4jets MT2W≥ 200 450 < MET < 550	≥4jets MT2W≥ 200 550 < MET < 650	≥4jets MT2W≥ 200 MET > 650
W+Jets→ $\ell\nu$, 800 < HT < 1200, madgraph pythia8	Inclusve	2.88 ± 0.31	1.09 ± 0.18	0.49 ± 0.13	0.20 ± 0.09	0.41 ± 0.09
	1 lepton	2.88 ± 0.31	1.09 ± 0.18	0.49 ± 0.13	0.20 ± 0.09	0.41 ± 0.09
	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	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$, 1200 < HT < 2500, madgraph pythia8	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
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$, 2500 < HT < Inf, madgraph pythia8	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	0.06 ± 0.02	0.02 ± 0.01	0.02 ± 0.01
	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	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
Rare	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
	1 lepton, from W	1.02 ± 0.50	0.21 ± 0.11	0.09 ± 0.08	0.03 ± 0.04	-0.00 ± 0.02
	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
	$Z \to \nu\nu$	6.81 ± 0.46	4.45 ± 0.55	1.46 ± 0.39	0.59 ± 0.23	0.21 ± 0.19
diBoson	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
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	0.61 ± 0.28	0.11 ± 0.10	0.13 ± 0.13	—	0.01 ± 0.01
	$Z \to \nu\nu$	0.77 ± 0.46	1.81 ± 0.55	0.50 ± 0.39	0.28 ± 0.22	0.07 ± 0.19
WW	Inclusve	0.94 ± 0.55	0.10 ± 0.10	0.13 ± 0.13	—	—
	1 lepton	0.48 ± 0.48	—	—	—	—
	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	—	—
	$Z \to \nu\nu$	—	—	—	—	—
$WW \to 2\ell2\nu$, powheg	Inclusve	0.46 ± 0.27	0.10 ± 0.10	0.13 ± 0.13	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	0.46 ± 0.27	0.10 ± 0.10	0.13 ± 0.13	—	—
	$Z \to \nu\nu$	—	—	—	—	—
$WW \to \ell\nu qq$, powheg	Inclusve	0.48 ± 0.48	—	—	—	—
	1 lepton	0.48 ± 0.48	—	—	—	—
	1 lepton, from W	0.48 ± 0.48	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
WZ	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
	1 lepton, from W	0.40 ± 0.13	0.29 ± 0.10	0.13 ± 0.06	0.01 ± 0.04	-0.00 ± 0.02
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	0.12 ± 0.09	0.01 ± 0.01	—	—	—
	$Z \to \nu\nu$	0.73 ± 0.46	1.78 ± 0.55	0.48 ± 0.39	0.28 ± 0.22	0.07 ± 0.19
$WZ \to 3\ell\nu$, powheg pythia8	Inclusve	0.11 ± 0.08	—	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	0.11 ± 0.08	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—

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Table 4 – continued from previous page

Sample	Classification	≥4jets MT2W≥200 250 < MET < 350	≥4jets MT2W≥200 350 < MET < 450	≥4jets MT2W≥200 450 < MET < 550	≥4jets MT2W≥200 550 < MET < 650	≥4jets MT2W≥200 MET > 650
$WZ{\to}2\ell2Q$, amcnlo pythia8	Inclusve	0.01 ± 0.01	0.01 ± 0.01	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	0.01 ± 0.01	0.01 ± 0.01	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
$WZ{\to}\ell\nu2Q$, amcnlo pythia8	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	0.29 ± 0.10	0.13 ± 0.06	0.01 ± 0.04	-0.00 ± 0.02
	1 lepton, from W	0.40 ± 0.13	0.29 ± 0.10	0.13 ± 0.06	0.01 ± 0.04	-0.00 ± 0.02
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
$WZ{\to}1\ell3\nu$, amcnlo pythia8	Inclusve	0.73 ± 0.46	1.78 ± 0.55	0.48 ± 0.39	0.28 ± 0.22	0.07 ± 0.19
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	0.73 ± 0.46	1.78 ± 0.55	0.48 ± 0.39	0.28 ± 0.22	0.07 ± 0.19
ZZ	Inclusve	0.06 ± 0.02	0.03 ± 0.01	0.02 ± 0.01	0.01 ± 0.00	0.01 ± 0.01
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	0.03 ± 0.02	0.01 ± 0.01	—	—	0.01 ± 0.01
	$Z \to \nu\nu$	0.03 ± 0.01	0.02 ± 0.01	0.02 ± 0.01	0.01 ± 0.00	0.01 ± 0.00
$ZZ{\to}2\ell2Q$, amcnlo pythia8	Inclusve	0.03 ± 0.02	0.01 ± 0.01	—	—	0.01 ± 0.01
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	0.03 ± 0.02	0.01 ± 0.01	—	—	0.01 ± 0.01
	$Z \to \nu\nu$	—	—	—	—	—
$ZZ{\to}2\ell2\nu$, powheg pythia8	Inclusve	0.04 ± 0.01	0.02 ± 0.01	0.02 ± 0.00	0.01 ± 0.00	0.00 ± 0.00
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	0.04 ± 0.01	0.02 ± 0.01	0.02 ± 0.00	0.01 ± 0.00	0.00 ± 0.00
$ZZ{\to}2Q2\nu$, amcnlo pythia8	Inclusve	-0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	—	0.00 ± 0.00
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	-0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	—	0.00 ± 0.00
$t\bar{t} + V$	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
	1 lepton, from W	0.14 ± 0.07	-0.08 ± 0.05	-0.04 ± 0.05	0.02 ± 0.02	—
	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
	$Z \to \nu\nu$	6.04 ± 0.07	2.64 ± 0.04	0.96 ± 0.03	0.31 ± 0.01	0.14 ± 0.01
$t\bar{t} + W$	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	—
	1 lepton, from W	0.14 ± 0.07	-0.08 ± 0.05	-0.04 ± 0.05	0.02 ± 0.02	—
	1 lepton, from t	0.04 ± 0.03	—	—	—	—
	≥ 2 leptons	1.97 ± 0.39	0.63 ± 0.25	0.19 ± 0.08	0.09 ± 0.07	0.13 ± 0.05
	$Z \to \nu\nu$	—	—	—	—	—
$t\bar{t} + W{\to}\ell\nu$, amcnlo pythia8	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	—
	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	1.73 ± 0.38	0.36 ± 0.21	0.19 ± 0.08	0.09 ± 0.07	0.10 ± 0.05
	$Z \to \nu\nu$	—	—	—	—	—

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Table 4 – continued from previous page

Sample	Classification	≥4jets MT2W≥ 200 $250 < MET < 350$	≥4jets MT2W≥ 200 $350 < MET < 450$	≥4jets MT2W≥ 200 $450 < MET < 550$	≥4jets MT2W≥ 200 $550 < MET < 650$	≥4jets MT2W≥ 200 $MET > 650$
	Inclusve	0.28 ± 0.09	0.27 ± 0.12	—	—	0.03 ± 0.03
	1 lepton	0.04 ± 0.03	—	—	—	—
$t\bar{t} + W \to QQ$, amcnlo pythia8	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	0.04 ± 0.03	—	—	—	—
	≥ 2 leptons	0.24 ± 0.09	0.27 ± 0.12	—	—	0.03 ± 0.03
	$Z \to \nu\nu$	—	—	—	—	—
	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	—	—	—	—	—
	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
	$Z \to \nu\nu$	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
$t\bar{t} + Z$, madgraph	1 lepton, from W	—	—	—	—	—
	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
	$Z \to \nu\nu$	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	—	—	—	—
$t\bar{t} + Z \to QQ$, amcnlo pythia8	1 lepton, from W	—	—	—	—	—
	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
	$Z \to \nu\nu$	—	—	—	—	—
	Inclusve	7.24 ± 0.72	2.53 ± 0.49	1.07 ± 0.28	0.11 ± 0.18	0.16 ± 0.11
	1 lepton	—	—	—	—	—
$t\bar{t} + Z \to 2\ell 2\nu$, amcnlo pythia8	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	0.31 ± 0.18	0.06 ± 0.10	0.02 ± 0.04	—	—
	$Z \to \nu\nu$	6.92 ± 0.69	2.47 ± 0.48	1.05 ± 0.28	0.11 ± 0.18	0.16 ± 0.11

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CR0b, Nominal Systematic, Yield Table for Input Samples

Sample	Classification	2jets modTopness≥ 6.4 $250 < MET < 350$	2jets modTopness≥ 6.4 $350 < MET < 450$	2jets modTopness≥ 6.4 $MET > 450$
Data, single e/μ, MET	Inclusve	371.00 ± 19.26	131.00 ± 11.45	93.00 ± 9.64
All Background	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
	1 lepton, from t	0.41 ± 0.34	0.07 ± 0.07	0.06 ± 0.06
	$\geq$ 2 leptons	46.70 ± 10.19	14.21 ± 5.98	2.55 ± 0.62
	$Z \to \nu\nu$	33.85 ± 2.28	12.33 ± 1.23	7.82 ± 0.88
$t\bar{t}$	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
	1 lepton, from W	—		
	1 lepton, from t	0.41 ± 0.34	0.07 ± 0.07	0.06 ± 0.06
	$\geq$ 2 leptons	43.15 ± 2.16	4.76 ± 0.69	0.67 ± 0.27
	$Z \to \nu\nu$	—		
$t\bar{t}$, single lepFromT, madgraph pythia8	Inclusve	0.33 ± 0.33	—	—
	1 lepton	0.33 ± 0.33	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	0.33 ± 0.33	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	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
	1 lepton, from W	—	—	—
	1 lepton, from t	0.08 ± 0.08	0.07 ± 0.07	0.06 ± 0.06
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
$t\bar{t}$, diLepton, madgraph pythia8, ext1	Inclusve	43.15 ± 2.16	4.76 ± 0.69	0.67 ± 0.27
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	43.15 ± 2.16	4.76 ± 0.69	0.67 ± 0.27
	$Z \to \nu\nu$	—	—	—
single t	Inclusve	3.71 ± 1.87	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	3.71 ± 1.87	—	—
	$Z \to \nu\nu$	—	—	—
single t $t - W$-channel	Inclusve	3.71 ± 1.87	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	3.71 ± 1.87	—	—
	$Z \to \nu\nu$	—	—	—
single t, $t - W$-channel, powheg pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
single $\bar{t}$, $t - W$-channel, powheg pythia8	Inclusve	3.71 ± 1.87	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	3.71 ± 1.87	—	—
	$Z \to \nu\nu$	—	—	—
single t non $t - W$-channel	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—

Table 5 – continued from previous page

Sample	Classification	2jets modTopness≥ 6.4 $250 < MET < 350$	2jets modTopness≥ 6.4 $350 < MET < 450$	2jets modTopness≥ 6.4 $MET > 450$
single t, s-channel, amcnlo pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
V+Jets	Inclusve	215.64 $\pm$ 16.52	69.50 $\pm$ 8.66	29.21 $\pm$ 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
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	-13.70 $\pm$ 9.69	5.91 $\pm$ 5.91	—
	$Z \to \nu\nu$	—	—	—
DY+Jets$\to \ell\ell$	Inclusve	-13.70 $\pm$ 9.69	5.91 $\pm$ 5.91	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	-13.70 $\pm$ 9.69	5.91 $\pm$ 5.91	—
	$Z \to \nu\nu$	—	—	—
DY+Jets$\to \ell\ell$, M10to50, amcnlo pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
DY+Jets$\to \ell\ell$, M50, amcnlo pythia8	Inclusve	-13.70 $\pm$ 9.69	5.91 $\pm$ 5.91	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	-13.70 $\pm$ 9.69	5.91 $\pm$ 5.91	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$	Inclusve	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 $\pm$ 3.46
	1 lepton, from W	229.35 $\pm$ 13.38	63.59 $\pm$ 6.33	29.21 $\pm$ 3.46
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $100 < HT < 200$, madgraph pythia8	Inclusve	62.02 $\pm$ 8.96	11.78 $\pm$ 3.76	3.78 $\pm$ 1.89
	1 lepton	62.02 $\pm$ 8.96	11.78 $\pm$ 3.76	3.78 $\pm$ 1.89
	1 lepton, from W	62.02 $\pm$ 8.96	11.78 $\pm$ 3.76	3.78 $\pm$ 1.89
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $200 < HT < 400$, madgraph pythia8	Inclusve	139.55 $\pm$ 9.19	29.95 $\pm$ 3.97	8.08 $\pm$ 1.91
	1 lepton	139.55 $\pm$ 9.19	29.95 $\pm$ 3.97	8.08 $\pm$ 1.91
	1 lepton, from W	139.55 $\pm$ 9.19	29.95 $\pm$ 3.97	8.08 $\pm$ 1.91
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $400 < HT < 600$, madgraph pythia8	Inclusve	21.43 $\pm$ 3.75	17.79 $\pm$ 3.15	9.08 $\pm$ 2.09
	1 lepton	21.43 $\pm$ 3.75	17.79 $\pm$ 3.15	9.08 $\pm$ 2.09
	1 lepton, from W	21.43 $\pm$ 3.75	17.79 $\pm$ 3.15	9.08 $\pm$ 2.09
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $600 < HT < 800$, madgraph pythia8	Inclusve	4.52 $\pm$ 0.61	3.08 $\pm$ 0.47	5.63 $\pm$ 0.58
	1 lepton	4.52 $\pm$ 0.61	3.08 $\pm$ 0.47	5.63 $\pm$ 0.58
	1 lepton, from W	4.52 $\pm$ 0.61	3.08 $\pm$ 0.47	5.63 $\pm$ 0.58
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—

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Table 5 – continued from previous page

Sample	Classification	2jets modTopness$\geq$ 6.4 $250 < MET < 350$	2jets modTopness$\geq$ 6.4 $350 < MET < 450$	2jets modTopness$\geq$ 6.4 $MET > 450$
W+Jets$\to \ell\nu$, $800 < HT < 1200$, madgraph pythia8	Inclusve	1.52 $\pm$ 0.18	0.76 $\pm$ 0.12	2.26 $\pm$ 0.19
	1 lepton	1.52 $\pm$ 0.18	0.76 $\pm$ 0.12	2.26 $\pm$ 0.19
	1 lepton, from W	1.52 $\pm$ 0.18	0.76 $\pm$ 0.12	2.26 $\pm$ 0.19
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $1200 < HT < 2500$, madgraph pythia8	Inclusve	0.24 $\pm$ 0.17	0.20 $\pm$ 0.14	0.35 $\pm$ 0.18
	1 lepton	0.24 $\pm$ 0.17	0.20 $\pm$ 0.14	0.35 $\pm$ 0.18
	1 lepton, from W	0.24 $\pm$ 0.17	0.20 $\pm$ 0.14	0.35 $\pm$ 0.18
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $2500 < HT < Inf$, madgraph pythia8	Inclusve	0.07 $\pm$ 0.01	0.02 $\pm$ 0.01	0.02 $\pm$ 0.01
	1 lepton	0.07 $\pm$ 0.01	0.02 $\pm$ 0.01	0.02 $\pm$ 0.01
	1 lepton, from W	0.07 $\pm$ 0.01	0.02 $\pm$ 0.01	0.02 $\pm$ 0.01
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
Rare	Inclusve	58.17 $\pm$ 3.47	19.27 $\pm$ 1.84	11.83 $\pm$ 1.36
	1 lepton	10.77 $\pm$ 2.25	3.40 $\pm$ 1.20	2.14 $\pm$ 0.86
	1 lepton, from W	10.77 $\pm$ 2.25	3.40 $\pm$ 1.20	2.14 $\pm$ 0.86
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	13.55 $\pm$ 1.33	3.54 $\pm$ 0.64	1.87 $\pm$ 0.56
	$Z \to \nu\nu$	33.85 $\pm$ 2.28	12.33 $\pm$ 1.23	7.82 $\pm$ 0.88
diBoson	Inclusve	56.71 $\pm$ 3.47	18.92 $\pm$ 1.84	11.63 $\pm$ 1.36
	1 lepton	10.77 $\pm$ 2.25	3.37 $\pm$ 1.20	2.11 $\pm$ 0.86
	1 lepton, from W	10.77 $\pm$ 2.25	3.37 $\pm$ 1.20	2.11 $\pm$ 0.86
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	13.22 $\pm$ 1.33	3.54 $\pm$ 0.64	1.85 $\pm$ 0.56
	$Z \to \nu\nu$	32.71 $\pm$ 2.28	12.01 $\pm$ 1.23	7.66 $\pm$ 0.88
WW	Inclusve	21.56 $\pm$ 2.59	6.16 $\pm$ 1.35	3.52 $\pm$ 1.02
	1 lepton	8.94 $\pm$ 2.24	2.93 $\pm$ 1.19	1.71 $\pm$ 0.86
	1 lepton, from W	8.94 $\pm$ 2.24	2.93 $\pm$ 1.19	1.71 $\pm$ 0.86
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	12.62 $\pm$ 1.31	3.24 $\pm$ 0.63	1.80 $\pm$ 0.56
	$Z \to \nu\nu$	—	—	—
$WW \to 2\ell2\nu$, powheg	Inclusve	12.62 $\pm$ 1.31	3.24 $\pm$ 0.63	1.80 $\pm$ 0.56
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	12.62 $\pm$ 1.31	3.24 $\pm$ 0.63	1.80 $\pm$ 0.56
	$Z \to \nu\nu$	—	—	—
$WW \to \ell\nu qq$, powheg	Inclusve	8.94 $\pm$ 2.24	2.93 $\pm$ 1.19	1.71 $\pm$ 0.86
	1 lepton	8.94 $\pm$ 2.24	2.93 $\pm$ 1.19	1.71 $\pm$ 0.86
	1 lepton, from W	8.94 $\pm$ 2.24	2.93 $\pm$ 1.19	1.71 $\pm$ 0.86
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
WZ	Inclusve	33.87 $\pm$ 2.31	12.41 $\pm$ 1.25	7.91 $\pm$ 0.89
	1 lepton	1.83 $\pm$ 0.27	0.44 $\pm$ 0.13	0.40 $\pm$ 0.10
	1 lepton, from W	1.83 $\pm$ 0.27	0.44 $\pm$ 0.13	0.40 $\pm$ 0.10
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.56 $\pm$ 0.17	0.30 $\pm$ 0.12	0.05 $\pm$ 0.04
	$Z \to \nu\nu$	31.48 $\pm$ 2.28	11.66 $\pm$ 1.23	7.47 $\pm$ 0.88
$WZ \to 3\ell\nu$, powheg pythia8	Inclusve	0.51 $\pm$ 0.16	0.29 $\pm$ 0.12	0.04 $\pm$ 0.04
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.51 $\pm$ 0.16	0.29 $\pm$ 0.12	0.04 $\pm$ 0.04
	$Z \to \nu\nu$	—	—	—

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Table 5 – continued from previous page

Sample	Classification	2jets modTopness$\geq$ 6.4 $250 < MET < 350$	2jets modTopness$\geq$ 6.4 $350 < MET < 450$	2jets modTopness$\geq$ 6.4 $MET > 450$
$WZ \to 2\ell 2Q$, amcnlo pythia8	Inclusve	0.05 ± 0.04	0.01 ± 0.01	0.01 ± 0.01
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.05 ± 0.04	0.01 ± 0.01	0.01 ± 0.01
	$Z \to \nu\nu$	—	—	—
$WZ \to \ell\nu 2Q$, amcnlo pythia8	Inclusve	1.83 ± 0.27	0.44 ± 0.13	0.40 ± 0.10
	1 lepton	1.83 ± 0.27	0.44 ± 0.13	0.40 ± 0.10
	1 lepton, from W	1.83 ± 0.27	0.44 ± 0.13	0.40 ± 0.10
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
$WZ \to 1\ell 3\nu$, amcnlo pythia8	Inclusve	31.48 ± 2.28	11.66 ± 1.23	7.47 ± 0.88
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	31.48 ± 2.28	11.66 ± 1.23	7.47 ± 0.88
ZZ	Inclusve	1.27 ± 0.07	0.35 ± 0.03	0.20 ± 0.02
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.04 ± 0.04	0.00 ± 0.01	—
	$Z \to \nu\nu$	1.23 ± 0.05	0.35 ± 0.03	0.20 ± 0.02
$ZZ \to 2\ell 2Q$, amcnlo pythia8	Inclusve	0.04 ± 0.04	0.00 ± 0.01	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.04 ± 0.04	0.00 ± 0.01	—
	$Z \to \nu\nu$	—	—	—
$ZZ \to 2\ell 2\nu$, powheg pythia8	Inclusve	1.18 ± 0.04	0.34 ± 0.02	0.19 ± 0.01
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	1.18 ± 0.04	0.34 ± 0.02	0.19 ± 0.01
$ZZ \to 2Q 2\nu$, amcnlo pythia8	Inclusve	0.05 ± 0.03	0.01 ± 0.02	0.01 ± 0.01
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	0.05 ± 0.03	0.01 ± 0.02	0.01 ± 0.01
$t\bar{t} + V$	Inclusve	1.47 ± 0.14	0.34 ± 0.05	0.20 ± 0.03
	1 lepton	—	0.03 ± 0.03	0.02 ± 0.02
	1 lepton, from W	—	0.03 ± 0.03	0.02 ± 0.02
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.33 ± 0.13	0.01 ± 0.04	0.02 ± 0.02
	$Z \to \nu\nu$	1.14 ± 0.03	0.31 ± 0.02	0.16 ± 0.01
$t\bar{t} + W$	Inclusve	0.32 ± 0.13	0.03 ± 0.05	0.04 ± 0.03
	1 lepton	—	0.03 ± 0.03	0.02 ± 0.02
	1 lepton, from W	—	0.03 ± 0.03	0.02 ± 0.02
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.32 ± 0.13	0.01 ± 0.04	0.02 ± 0.02
	$Z \to \nu\nu$	—	—	—
$t\bar{t} + W \to \ell\nu$, amcnlo pythia8	Inclusve	0.26 ± 0.13	0.06 ± 0.04	0.02 ± 0.02
	1 lepton	—	0.03 ± 0.03	0.02 ± 0.02
	1 lepton, from W	—	0.03 ± 0.03	0.02 ± 0.02
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.26 ± 0.13	0.03 ± 0.03	—
	$Z \to \nu\nu$	—	—	—

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Table 5 – continued from previous page

Sample	Classification	2jets modTopness≥ 6.4 250 < MET < 350	2jets modTopness≥ 6.4 350 < MET < 450	2jets modTopness≥ 6.4 MET > 450
$t\bar{t} + W \rightarrow QQ$, amcnlo pythia8	Inclusve	0.06 ± 0.04	-0.03 ± 0.03	0.02 ± 0.02
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	0.06 ± 0.04	-0.03 ± 0.03	0.02 ± 0.02
	$Z \rightarrow \nu\nu$	—	—	—
$t\bar{t} + Z$	Inclusve	1.14 ± 0.03	0.31 ± 0.02	0.16 ± 0.01
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	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	0.16 ± 0.01
$t\bar{t} + Z$, madgraph	Inclusve	1.14 ± 0.03	0.31 ± 0.02	0.16 ± 0.01
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	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	0.16 ± 0.01
$t\bar{t} + Z \rightarrow QQ$, amcnlo pythia8	Inclusve	0.05 ± 0.05	0.03 ± 0.03	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	0.05 ± 0.05	0.03 ± 0.03	—
	$Z \rightarrow \nu\nu$	—	—	—
$t\bar{t} + Z \rightarrow 2\ell 2\nu$, amcnlo pythia8	Inclusve	1.07 ± 0.25	0.32 ± 0.12	0.25 ± 0.09
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	0.06 ± 0.04	—	—
	$Z \rightarrow \nu\nu$	1.01 ± 0.25	0.32 ± 0.12	0.25 ± 0.09

CR0b, Nominal Systematic, Yield Table for Input Samples

Sample	Classification	3jets MT2W≥200 250 < MET < 350	3jets MT2W≥200 350 < MET < 450	3jets MT2W≥200 450 < MET < 550	3jets MT2W≥200 MET > 550
Data, single e/μ, MET	Inclusve	164.00 ± 12.81	48.00 ± 6.93	17.00 ± 4.12	25.00 ± 5.00
All Background	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
	1 lepton, from W	93.41 ± 7.34	40.07 ± 4.41	11.72 ± 2.05	9.52 ± 1.65
	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
	$Z \to \nu\nu$	18.13 ± 1.51	7.77 ± 0.89	1.81 ± 0.55	2.44 ± 0.42
$t\bar{t}$	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	—	—	—	—
	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
	$Z \to \nu\nu$	—	—	—	—
$t\bar{t}$, single lepFromT, madgraph pythia8	Inclusve	0.32 ± 0.32	—	—	0.20 ± 0.20
	1 lepton	0.32 ± 0.32	—	—	0.20 ± 0.20
	1 lepton, from W	—	—	—	—
	1 lepton, from t	0.32 ± 0.32	—	—	0.20 ± 0.20
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	Inclusve	0.33 ± 0.16	—	—	0.07 ± 0.07
	1 lepton	0.33 ± 0.16	—	—	0.07 ± 0.07
	1 lepton, from W	—	—	—	—
	1 lepton, from t	0.33 ± 0.16	—	—	0.07 ± 0.07
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
$t\bar{t}$, diLepton, madgraph pythia8, ext1	Inclusve	26.99 ± 1.90	5.65 ± 0.73	0.63 ± 0.21	0.44 ± 0.17
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	26.99 ± 1.90	5.65 ± 0.73	0.63 ± 0.21	0.44 ± 0.17
	$Z \to \nu\nu$	—	—	—	—
single t	Inclusve	1.08 ± 1.08	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	1.08 ± 1.08	—	—	—
	$Z \to \nu\nu$	—	—	—	—
single t $t - W$-channel	Inclusve	1.08 ± 1.08	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	1.08 ± 1.08	—	—	—
	$Z \to \nu\nu$	—	—	—	—
single t, $t - W$-channel, powheg pythia8	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
single $\bar{t}$, $t - W$-channel, powheg pythia8	Inclusve	1.08 ± 1.08	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	1.08 ± 1.08	—	—	—
	$Z \to \nu\nu$	—	—	—	—
single t non $t - W$-channel	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—

Table 6 – continued from previous page

Sample	Classification	3jets MT2W≥200 $250 < MET < 350$	3jets MT2W≥200 $350 < MET < 450$	3jets MT2W≥200 $450 < MET < 550$	3jets MT2W≥200 $MET > 550$
single t, s-channel, amcnlo pythia8	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
V+Jets	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
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
DY+Jets$\to \ell\ell$	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
DY+Jets$\to \ell\ell$, M10to50, amcnlo pythia8	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
DY+Jets$\to \ell\ell$, M50, amcnlo pythia8	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
W+Jets$\to \ell\nu$	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
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
W+Jets$\to \ell\nu$, $100 < HT < 200$, madgraph pythia8	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
	1 lepton, from W	6.76 ± 3.02	2.22 ± 1.57	1.02 ± 1.02	1.60 ± 1.13
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
W+Jets$\to \ell\nu$, $200 < HT < 400$, madgraph pythia8	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
	1 lepton, from W	40.36 ± 5.01	8.45 ± 2.11	2.33 ± 1.04	0.77 ± 0.54
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
W+Jets$\to \ell\nu$, $400 < HT < 600$, madgraph pythia8	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
	1 lepton, from W	25.77 ± 4.13	16.45 ± 3.13	3.02 ± 1.23	1.62 ± 0.81
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
W+Jets$\to \ell\nu$, $600 < HT < 800$, madgraph pythia8	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
	1 lepton, from W	9.50 ± 0.90	5.32 ± 0.62	2.43 ± 0.40	1.69 ± 0.30
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—

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Table 6 – continued from previous page

Sample	Classification	3jets MT2W≥200 $250 < MET < 350$	3jets MT2W≥200 $350 < MET < 450$	3jets MT2W≥200 $450 < MET < 550$	3jets MT2W≥200 $MET > 550$
	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
W+Jets→ $\ell\nu$, $800 < HT < 1200$, madgraph pythia8	1 lepton, from W	4.89 ± 0.33	2.26 ± 0.21	1.51 ± 0.16	2.06 ± 0.17
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
	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→ $\ell\nu$, $1200 < HT < 2500$, 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	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
	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→ $\ell\nu$, $2500 < HT < Inf$, madgraph pythia8	1 lepton, from W	0.12 ± 0.02	0.05 ± 0.01	0.03 ± 0.01	0.03 ± 0.01
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
	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
	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
	$Z \to \nu\nu$	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
diBoson	1 lepton, from W	3.75 ± 1.16	4.68 ± 1.48	0.70 ± 0.54	0.89 ± 0.54
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	7.38 ± 1.01	2.42 ± 0.53	0.40 ± 0.21	0.44 ± 0.18
	$Z \to \nu\nu$	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
WW	1 lepton, from W	2.27 ± 1.14	4.17 ± 1.48	0.54 ± 0.54	0.75 ± 0.53
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	6.93 ± 1.00	2.38 ± 0.53	0.41 ± 0.21	0.35 ± 0.17
	$Z \to \nu\nu$	—	—	—	—
	Inclusve	6.93 ± 1.00	2.38 ± 0.53	0.41 ± 0.21	0.35 ± 0.17
	1 lepton	—	—	—	—
$WW{\to}2\ell2\nu$, powheg	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	6.93 ± 1.00	2.38 ± 0.53	0.41 ± 0.21	0.35 ± 0.17
	$Z \to \nu\nu$	—	—	—	—
	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
$WW{\to}\ell\nu qq$, powheg	1 lepton, from W	2.27 ± 1.14	4.17 ± 1.48	0.54 ± 0.54	0.75 ± 0.53
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
	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	—	—	—	—
	≥ 2 leptons	0.43 ± 0.15	0.04 ± 0.05	-0.01 ± 0.01	0.10 ± 0.06
	$Z \to \nu\nu$	16.09 ± 1.51	7.07 ± 0.89	1.55 ± 0.55	2.29 ± 0.42
	Inclusve	0.38 ± 0.15	0.04 ± 0.04	—	0.10 ± 0.06
	1 lepton	—	—	—	—
$WZ{\to}3\ell\nu$, powheg pythia8	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	0.38 ± 0.15	0.04 ± 0.04	—	0.10 ± 0.06
	$Z \to \nu\nu$	—	—	—	—

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Table 6 – continued from previous page

Sample	Classification	3jets MT2W≥200 $250 < MET < 350$	3jets MT2W≥200 $350 < MET < 450$	3jets MT2W≥200 $450 < MET < 550$	3jets MT2W≥200 $MET > 550$
$WZ \to 2\ell 2Q$, amcnlo pythia8	Inclusve	0.04 ± 0.04	-0.00 ± 0.02	-0.01 ± 0.01	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	0.04 ± 0.04	-0.00 ± 0.02	-0.01 ± 0.01	—
	$Z \to \nu\nu$	—	—	—	—
$WZ \to \ell\nu 2Q$, amcnlo pythia8	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
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
$WZ \to 1\ell 3\nu$, amcnlo pythia8	Inclusve	16.09 ± 1.51	7.07 ± 0.89	1.55 ± 0.55	2.29 ± 0.42
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	16.09 ± 1.51	7.07 ± 0.89	1.55 ± 0.55	2.29 ± 0.42
ZZ	Inclusve	0.50 ± 0.04	0.19 ± 0.02	0.09 ± 0.01	0.05 ± 0.01
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	0.03 ± 0.02	0.00 ± 0.01	-0.01 ± 0.01	—
	$Z \to \nu\nu$	0.47 ± 0.03	0.19 ± 0.02	0.10 ± 0.01	0.05 ± 0.01
$ZZ \to 2\ell 2Q$, amcnlo pythia8	Inclusve	0.03 ± 0.02	0.00 ± 0.01	-0.01 ± 0.01	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	0.03 ± 0.02	0.00 ± 0.01	-0.01 ± 0.01	—
	$Z \to \nu\nu$	—	—	—	—
$ZZ \to 2\ell 2\nu$, powheg pythia8	Inclusve	0.44 ± 0.03	0.17 ± 0.01	0.08 ± 0.01	0.05 ± 0.01
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	0.44 ± 0.03	0.17 ± 0.01	0.08 ± 0.01	0.05 ± 0.01
$ZZ \to 2Q2\nu$, amcnlo pythia8	Inclusve	0.03 ± 0.02	0.01 ± 0.01	0.02 ± 0.01	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	0.03 ± 0.02	0.01 ± 0.01	0.02 ± 0.01	—
$t\bar{t} + V$	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	—
	1 lepton, from W	—	—	—	—
	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	—
	$Z \to \nu\nu$	1.57 ± 0.04	0.51 ± 0.02	0.16 ± 0.01	0.09 ± 0.01
$t\bar{t} + W$	Inclusve	0.49 ± 0.17	0.03 ± 0.07	0.04 ± 0.05	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	0.49 ± 0.17	0.03 ± 0.07	0.04 ± 0.05	—
	$Z \to \nu\nu$	—	—	—	—
$t\bar{t} + W \to \ell\nu$, amcnlo pythia8	Inclusve	0.39 ± 0.16	0.03 ± 0.07	0.04 ± 0.05	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	0.39 ± 0.16	0.03 ± 0.07	0.04 ± 0.05	—
	$Z \to \nu\nu$	—	—	—	—

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Table 6 – continued from previous page

Sample	Classification	3jets MT2W≥200 250 < MET < 350	3jets MT2W≥200 350 < MET < 450	3jets MT2W≥200 450 < MET < 550	3jets MT2W≥200 MET > 550
$t\bar{t} + W \rightarrow QQ$, amcnlo pythia8	Inclusve	0.10 ± 0.05	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	0.10 ± 0.05	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—	—
$t\bar{t} + Z$	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	—	—	—	—
	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
$t\bar{t} + Z$, madgraph	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	—	—	—	—
	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
$t\bar{t} + Z \rightarrow QQ$, amcnlo pythia8	Inclusve	0.07 ± 0.05	—	-0.02 ± 0.02	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	0.07 ± 0.05	—	-0.02 ± 0.02	—
	$Z \rightarrow \nu\nu$	—	—	—	—
$t\bar{t} + Z \rightarrow 2\ell2\nu$, amcnlo pythia8	Inclusve	1.45 ± 0.37	0.42 ± 0.17	0.30 ± 0.13	0.17 ± 0.07
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	-0.04 ± 0.04	—	—	—
	$Z \rightarrow \nu\nu$	1.49 ± 0.37	0.42 ± 0.17	0.30 ± 0.13	0.17 ± 0.07

Sample	Classification	$\geq$4jets MT2W< 200 $250 < MET < 350$	$\geq$4jets MT2W< 200 $350 < MET < 450$	$\geq$4jets MT2W< 200 $MET > 450$
Data, single e/μ, MET	Inclusve	87.00 ± 9.33	20.00 ± 4.47	15.00 ± 3.87
All Background	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	10.62 ± 2.20	1.43 ± 0.24
	1 lepton, from t	3.15 ± 1.11	0.09 ± 0.09	0.23 ± 0.15
	$\geq$ 2 leptons	73.46 ± 3.40	12.75 ± 1.38	3.86 ± 0.60
	$Z \to \nu\nu$	7.73 ± 0.89	1.12 ± 0.45	1.09 ± 0.29
$t\bar{t}$	Inclusve	72.12 ± 3.29	11.60 ± 1.34	3.55 ± 0.58
	1 lepton	3.14 ± 1.11	0.09 ± 0.09	0.21 ± 0.15
	1 lepton, from W	—	—	—
	1 lepton, from t	3.14 ± 1.11	0.09 ± 0.09	0.21 ± 0.15
	$\geq$ 2 leptons	68.98 ± 3.10	11.51 ± 1.33	3.35 ± 0.56
	$Z \to \nu\nu$	—	—	—
$t\bar{t}$, single lepFromT, madgraph pythia8	Inclusve	2.30 ± 1.06	—	—
	1 lepton	2.30 ± 1.06	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	2.30 ± 1.06	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	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
	1 lepton, from W	—	—	—
	1 lepton, from t	0.85 ± 0.34	0.09 ± 0.09	0.21 ± 0.15
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
$t\bar{t}$, diLepton, madgraph pythia8, ext1	Inclusve	68.98 ± 3.10	11.51 ± 1.33	3.35 ± 0.56
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	68.98 ± 3.10	11.51 ± 1.33	3.35 ± 0.56
	$Z \to \nu\nu$	—	—	—
single t	Inclusve	1.24 ± 1.24	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	1.24 ± 1.24	—	—
	$Z \to \nu\nu$	—	—	—
single t $t - W$-channel	Inclusve	1.24 ± 1.24	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	1.24 ± 1.24	—	—
	$Z \to \nu\nu$	—	—	—
single t, $t - W$-channel, powheg pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
single $\bar{t}$, $t - W$-channel, powheg pythia8	Inclusve	1.24 ± 1.24	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	1.24 ± 1.24	—	—
	$Z \to \nu\nu$	—	—	—
single t non $t - W$-channel	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—

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Table 7 – continued from previous page

Sample	Classification	≥4jets MT2W< 200 250 < MET < 350	≥4jets MT2W< 200 350 < MET < 450	≥4jets MT2W< 200 MET > 450
single t, s-channel, amcnlo pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—
V+Jets	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
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—
DY+Jets→ $\ell\ell$	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—
DY+Jets→ $\ell\ell$, M10to50, amcnlo pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—
DY+Jets→ $\ell\ell$, M50, amcnlo pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—
W+Jets→ $\ell\nu$	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
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—
W+Jets→ $\ell\nu$, 100 < HT < 200, madgraph pythia8	Inclusve	1.29 ± 1.29	1.11 ± 1.11	—
	1 lepton	1.29 ± 1.29	1.11 ± 1.11	—
	1 lepton, from W	1.29 ± 1.29	1.11 ± 1.11	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—
W+Jets→ $\ell\nu$, 200 < HT < 400, madgraph pythia8	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	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—
W+Jets→ $\ell\nu$, 400 < HT < 600, madgraph pythia8	Inclusve	10.08 ± 2.61	3.97 ± 1.50	—
	1 lepton	10.08 ± 2.61	3.97 ± 1.50	—
	1 lepton, from W	10.08 ± 2.61	3.97 ± 1.50	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—
W+Jets→ $\ell\nu$, 600 < HT < 800, madgraph pythia8	Inclusve	4.20 ± 0.60	2.07 ± 0.39	0.63 ± 0.19
	1 lepton	4.20 ± 0.60	2.07 ± 0.39	0.63 ± 0.19
	1 lepton, from W	4.20 ± 0.60	2.07 ± 0.39	0.63 ± 0.19
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—

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Table 7 – continued from previous page

Sample	Classification	≥4jets MT2W< 200 250 < MET < 350	≥4jets MT2W< 200 350 < MET < 450	≥4jets MT2W< 200 MET > 450
W+Jets→ $\ell\nu$, 800 < HT < 1200, madgraph pythia8	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
	1 lepton, from W	2.47 ± 0.23	0.71 ± 0.12	0.61 ± 0.10
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets→ $\ell\nu$, 1200 < HT < 2500, madgraph pythia8	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
	1 lepton, from W	1.03 ± 0.37	0.50 ± 0.25	0.17 ± 0.12
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets→ $\ell\nu$, 2500 < HT < Inf, madgraph pythia8	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
	1 lepton, from W	0.03 ± 0.01	0.01 ± 0.01	0.01 ± 0.00
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
Rare	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
	1 lepton, from W	2.08 ± 0.86	0.66 ± 0.53	0.01 ± 0.02
	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
	$Z \to \nu\nu$	7.73 ± 0.89	1.12 ± 0.45	1.09 ± 0.29
diBoson	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
	1 lepton, from W	2.05 ± 0.86	0.66 ± 0.53	0.01 ± 0.02
	1 lepton, from t	—	—	—
	≥ 2 leptons	3.09 ± 0.64	1.11 ± 0.35	0.47 ± 0.21
	$Z \to \nu\nu$	5.82 ± 0.89	0.73 ± 0.45	1.01 ± 0.29
WW	Inclusve	3.96 ± 1.05	1.47 ± 0.62	0.47 ± 0.21
	1 lepton	1.19 ± 0.84	0.52 ± 0.52	—
	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
	$Z \to \nu\nu$	—	—	—
$WW \to 2\ell2\nu$, powheg	Inclusve	2.77 ± 0.62	0.95 ± 0.34	0.47 ± 0.21
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	2.77 ± 0.62	0.95 ± 0.34	0.47 ± 0.21
	$Z \to \nu\nu$	—	—	—
$WW \to \ell\nu qq$, powheg	Inclusve	1.19 ± 0.84	0.52 ± 0.52	—
	1 lepton	1.19 ± 0.84	0.52 ± 0.52	—
	1 lepton, from W	1.19 ± 0.84	0.52 ± 0.52	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
WZ	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
	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	—
	$Z \to \nu\nu$	5.65 ± 0.89	0.70 ± 0.45	0.99 ± 0.29
$WZ \to 3\ell\nu$, powheg pythia8	Inclusve	0.31 ± 0.13	0.15 ± 0.09	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	0.31 ± 0.13	0.15 ± 0.09	—
	$Z \to \nu\nu$	—	—	—

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Table 7 – continued from previous page

Sample	Classification	$\geq$4jets MT2W$<$ 200 $250 < MET < 350$	$\geq$4jets MT2W$<$ 200 $350 < MET < 450$	$\geq$4jets MT2W$<$ 200 $MET > 450$
$WZ{\to}2\ell 2Q$, amcnlo pythia8	Inclusve	0.01 ± 0.02	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.01 ± 0.02	—	—
	$Z \to \nu\nu$	—	—	—
$WZ{\to}\ell\nu 2Q$, amcnlo pythia8	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
	1 lepton, from W	0.86 ± 0.18	0.13 ± 0.08	0.01 ± 0.02
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
$WZ{\to}1\ell 3\nu$, amcnlo pythia8	Inclusve	5.65 ± 0.89	0.70 ± 0.45	0.99 ± 0.29
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	5.65 ± 0.89	0.70 ± 0.45	0.99 ± 0.29
ZZ	Inclusve	0.17 ± 0.03	0.03 ± 0.01	0.01 ± 0.00
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.00 ± 0.02	0.01 ± 0.01	—
	$Z \to \nu\nu$	0.17 ± 0.02	0.03 ± 0.01	0.01 ± 0.00
$ZZ{\to}2\ell 2Q$, amcnlo pythia8	Inclusve	0.00 ± 0.02	0.01 ± 0.01	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.00 ± 0.02	0.01 ± 0.01	—
	$Z \to \nu\nu$	—	—	—
$ZZ{\to}2\ell 2\nu$, powheg pythia8	Inclusve	0.16 ± 0.02	0.03 ± 0.01	0.01 ± 0.00
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	0.16 ± 0.02	0.03 ± 0.01	0.01 ± 0.00
$ZZ{\to}2Q2\nu$, amcnlo pythia8	Inclusve	0.00 ± 0.01	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	0.00 ± 0.01	—	—
$t\bar{t} + V$	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
	1 lepton, from W	0.03 ± 0.03	—	—
	1 lepton, from t	0.01 ± 0.00	0.00 ± 0.00	0.02 ± 0.02
	$\geq$ 2 leptons	0.15 ± 0.22	0.13 ± 0.09	0.04 ± 0.06
	$Z \to \nu\nu$	1.91 ± 0.05	0.39 ± 0.02	0.09 ± 0.01
$t\bar{t} + W$	Inclusve	0.15 ± 0.23	0.13 ± 0.09	0.06 ± 0.06
	1 lepton	0.03 ± 0.03	—	0.02 ± 0.02
	1 lepton, from W	0.03 ± 0.03	—	—
	1 lepton, from t	—	—	0.02 ± 0.02
	$\geq$ 2 leptons	0.12 ± 0.22	0.13 ± 0.09	0.04 ± 0.06
	$Z \to \nu\nu$	—	—	—
$t\bar{t} + W{\to}\ell\nu$, amcnlo pythia8	Inclusve	-0.03 ± 0.19	0.06 ± 0.08	0.02 ± 0.04
	1 lepton	0.03 ± 0.03	—	—
	1 lepton, from W	0.03 ± 0.03	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	-0.07 ± 0.19	0.06 ± 0.08	0.02 ± 0.04
	$Z \to \nu\nu$	—	—	—

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Table 7 – continued from previous page

Sample	Classification	≥4jets MT2W< 200 250 < MET < 350	≥4jets MT2W< 200 350 < MET < 450	≥4jets MT2W< 200 MET > 450
	Inclusve	0.19 ± 0.12	0.07 ± 0.05	0.04 ± 0.04
	1 lepton	—	—	0.02 ± 0.02
	1 lepton, from W	—	—	—
$t\bar{t} + W \rightarrow QQ$, amcnlo pythia8	1 lepton, from t	—	—	0.02 ± 0.02
	≥ 2 leptons	0.19 ± 0.12	0.07 ± 0.05	0.02 ± 0.04
	$Z \rightarrow \nu\nu$	—	—	—
	Inclusve	1.95 ± 0.05	0.40 ± 0.02	0.09 ± 0.01
	1 lepton	0.01 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
	1 lepton, from W	—	—	—
$t\bar{t} + Z$	1 lepton, from t	0.01 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
	≥ 2 leptons	0.03 ± 0.01	—	0.00 ± 0.00
	$Z \rightarrow \nu\nu$	1.91 ± 0.05	0.39 ± 0.02	0.09 ± 0.01
	Inclusve	1.95 ± 0.05	0.40 ± 0.02	0.09 ± 0.01
	1 lepton	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	0.01 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
	≥ 2 leptons	0.03 ± 0.01	—	0.00 ± 0.00
	$Z \rightarrow \nu\nu$	1.91 ± 0.05	0.39 ± 0.02	0.09 ± 0.01
	Inclusve	0.27 ± 0.18	-0.11 ± 0.10	0.21 ± 0.14
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
$t\bar{t} + Z \rightarrow QQ$, amcnlo pythia8	1 lepton, from t	—	—	—
	≥ 2 leptons	0.27 ± 0.18	-0.11 ± 0.10	0.21 ± 0.14
	$Z \rightarrow \nu\nu$	—	—	—
	Inclusve	2.66 ± 0.53	0.33 ± 0.21	0.19 ± 0.12
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
$t\bar{t} + Z \rightarrow 2\ell 2\nu$, amcnlo pythia8	1 lepton, from t	—	—	—
	≥ 2 leptons	0.11 ± 0.09	—	-0.03 ± 0.03
	$Z \rightarrow \nu\nu$	2.55 ± 0.52	0.33 ± 0.21	0.22 ± 0.11

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CR0b, Nominal Systematic, Yield Table for Input Samples

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$4jets MT2W$\geq$ 200 $550 < MET < 650$	$\geq$4jets MT2W$\geq$ 200 $MET > 650$
Data, single e/μ, MET	Inclusve	86.00 ± 9.27	32.00 ± 5.66	6.00 ± 2.45	6.00 ± 2.45	7.00 ± 2.65
All Background	Inclusve	118.69 ± 11.74	34.69 ± 3.03	13.45 ± 1.72	7.70 ± 1.63	5.91 ± 1.11
	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
	$\geq$ 2 leptons	49.14 ± 10.35	8.75 ± 0.97	1.78 ± 0.41	2.40 ± 1.29	0.48 ± 0.20
	$Z \to \nu\nu$	7.55 ± 0.98	4.32 ± 0.67	2.45 ± 0.48	0.77 ± 0.26	0.81 ± 0.25
$t\bar{t}$	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 lepton, from W	—	—	—	—	—
	1 lepton, from t	1.64 ± 0.55	0.28 ± 0.28	—	—	0.06 ± 0.06
	$\geq$ 2 leptons	29.06 ± 2.07	6.54 ± 0.86	1.32 ± 0.34	0.62 ± 0.25	0.20 ± 0.12
	$Z \to \nu\nu$	—	—	—	—	—
$t\bar{t}$, single lepFromT, madgraph pythia8	Inclusve	0.41 ± 0.41	0.28 ± 0.28	—	—	—
	1 lepton	0.41 ± 0.41	0.28 ± 0.28	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	0.41 ± 0.41	0.28 ± 0.28	—	—	—
	$\geq$ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	Inclusve	1.23 ± 0.36	—	—	—	0.06 ± 0.06
	1 lepton	1.23 ± 0.36	—	—	—	0.06 ± 0.06
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	1.23 ± 0.36	—	—	—	0.06 ± 0.06
	$\geq$ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
$t\bar{t}$, diLepton, madgraph pythia8, ext1	Inclusve	29.06 ± 2.07	6.54 ± 0.86	1.32 ± 0.34	0.62 ± 0.25	0.20 ± 0.12
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	$\geq$ 2 leptons	29.06 ± 2.07	6.54 ± 0.86	1.32 ± 0.34	0.62 ± 0.25	0.20 ± 0.12
	$Z \to \nu\nu$	—	—	—	—	—
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	—	—	—	—	—
	$\geq$ 2 leptons	1.03 ± 1.03	—	—	1.24 ± 1.24	—
	$Z \to \nu\nu$	—	—	—	—	—
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 lepton, from t	—	—	—	—	—
	$\geq$ 2 leptons	1.03 ± 1.03	—	—	1.24 ± 1.24	—
	$Z \to \nu\nu$	—	—	—	—	—
single t, $t - W$-channel, powheg pythia8	Inclusve	—	—	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
single $\bar{t}$, $t - W$-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 lepton, from t	—	—	—	—	—
	$\geq$ 2 leptons	1.03 ± 1.03	—	—	1.24 ± 1.24	—
	$Z \to \nu\nu$	—	—	—	—	—
single t non $t - W$-channel	Inclusve	—	—	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—

Continued on next page

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Table 8 – continued from previous page

Sample	Classification	≥4jets MT2W≥ 200 $250 < MET < 350$	≥4jets MT2W≥ 200 $350 < MET < 450$	≥4jets MT2W≥ 200 $450 < MET < 550$	≥4jets MT2W≥ 200 $550 < MET < 650$	≥4jets MT2W≥ 200 $MET > 650$
single t, s-channel, amcnlo pythia8	Inclusve	—	—	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
V+Jets	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
	1 lepton, from W	53.82 ± 5.05	20.56 ± 2.73	8.54 ± 1.53	4.06 ± 0.88	4.17 ± 1.01
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	14.23 ± 10.06	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
DY+Jets→ $\ell\ell$	Inclusve	14.23 ± 10.06	—	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	14.23 ± 10.06	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
DY+Jets→ $\ell\ell$, M10to50, amcnlo pythia8	Inclusve	—	—	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
DY+Jets→ $\ell\ell$, M50, amcnlo pythia8	Inclusve	14.23 ± 10.06	—	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	14.23 ± 10.06	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$	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
	1 lepton, from W	53.82 ± 5.05	20.56 ± 2.73	8.54 ± 1.53	4.06 ± 0.88	4.17 ± 1.01
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$, $100 < HT < 200$, madgraph pythia8	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
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$, $200 < HT < 400$, madgraph pythia8	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
	1 lepton, from W	16.26 ± 3.20	3.92 ± 1.50	1.03 ± 0.73	—	0.31 ± 0.31
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$, $400 < HT < 600$, madgraph pythia8	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
	1 lepton, from W	15.73 ± 3.21	7.75 ± 2.16	2.76 ± 1.23	1.40 ± 0.81	1.02 ± 0.59
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$, $600 < HT < 800$, madgraph pythia8	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
	1 lepton, from W	8.88 ± 0.87	3.38 ± 0.50	2.48 ± 0.43	0.97 ± 0.24	0.40 ± 0.13
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—

Table 8 – continued from previous page

Sample	Classification	≥4jets MT2W≥ 200 250 < MET < 350	≥4jets MT2W≥ 200 350 < MET < 450	≥4jets MT2W≥ 200 450 < MET < 550	≥4jets MT2W≥ 200 550 < MET < 650	≥4jets MT2W≥ 200 MET > 650
W+Jets→ $\ell\nu$, 800 < HT < 1200, madgraph pythia8	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
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$, 1200 < HT < 2500, madgraph pythia8	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
	1 lepton, from W	2.98 ± 0.61	2.00 ± 0.47	0.63 ± 0.26	0.67 ± 0.24	0.77 ± 0.22
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$, 2500 < HT < Inf, madgraph pythia8	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
	1 lepton, from W	0.26 ± 0.03	0.14 ± 0.02	0.06 ± 0.01	0.02 ± 0.01	0.05 ± 0.01
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
Rare	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
	1 lepton, from W	5.30 ± 1.57	0.77 ± 0.52	0.68 ± 0.48	0.46 ± 0.40	0.39 ± 0.32
	1 lepton, from t	0.04 ± 0.03	0.00 ± 0.00	—	—	—
	≥ 2 leptons	4.82 ± 0.79	2.21 ± 0.45	0.46 ± 0.22	0.54 ± 0.24	0.29 ± 0.16
	$Z \to \nu\nu$	7.55 ± 0.98	4.32 ± 0.67	2.45 ± 0.48	0.77 ± 0.26	0.81 ± 0.25
diBoson	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
	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	—	—	—	—	—
	≥ 2 leptons	4.09 ± 0.74	1.54 ± 0.42	0.45 ± 0.20	0.55 ± 0.23	0.35 ± 0.16
	$Z \to \nu\nu$	6.06 ± 0.98	3.63 ± 0.67	2.19 ± 0.48	0.69 ± 0.26	0.77 ± 0.25
WW	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
	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	—	—	—	—	—
	≥ 2 leptons	3.71 ± 0.73	1.42 ± 0.41	0.33 ± 0.19	0.51 ± 0.23	0.35 ± 0.16
	$Z \to \nu\nu$	—	—	—	—	—
$WW \to 2\ell2\nu$, powheg	Inclusve	3.71 ± 0.73	1.42 ± 0.41	0.33 ± 0.19	0.51 ± 0.23	0.35 ± 0.16
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	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
	$Z \to \nu\nu$	—	—	—	—	—
$WW \to \ell\nu qq$, powheg	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	0.47 ± 0.47	0.40 ± 0.40	0.32 ± 0.32
	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	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
WZ	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
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	0.38 ± 0.13	0.11 ± 0.08	0.12 ± 0.07	0.05 ± 0.04	—
	$Z \to \nu\nu$	5.88 ± 0.98	3.54 ± 0.67	2.12 ± 0.48	0.67 ± 0.26	0.76 ± 0.25
$WZ \to 3\ell\nu$, powheg pythia8	Inclusve	0.30 ± 0.12	0.13 ± 0.07	0.12 ± 0.07	0.03 ± 0.03	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	0.30 ± 0.12	0.13 ± 0.07	0.12 ± 0.07	0.03 ± 0.03	—
	$Z \to \nu\nu$	—	—	—	—	—

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Table 8 – continued from previous page

Sample	Classification	≥4jets MT2W≥ 200 $250 < MET < 350$	≥4jets MT2W≥ 200 $350 < MET < 450$	≥4jets MT2W≥ 200 $450 < MET < 550$	≥4jets MT2W≥ 200 $550 < MET < 650$	≥4jets MT2W≥ 200 $MET > 650$
$WZ{\to}2\ell2Q$, amcnlo pythia8	Inclusve	0.08 ± 0.03	-0.02 ± 0.02	—	0.01 ± 0.01	—
	1 lepton	—	—		—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	0.08 ± 0.03	-0.02 ± 0.02	—	0.01 ± 0.01	—
	$Z \to \nu\nu$	—	—	—	—	—
$WZ{\to}\ell\nu2Q$, amcnlo pythia8	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
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
$WZ{\to}1\ell3\nu$, amcnlo pythia8	Inclusve	5.88 ± 0.98	3.54 ± 0.67	2.12 ± 0.48	0.67 ± 0.26	0.76 ± 0.25
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	5.88 ± 0.98	3.54 ± 0.67	2.12 ± 0.48	0.67 ± 0.26	0.76 ± 0.25
ZZ	Inclusve	0.18 ± 0.02	0.09 ± 0.02	0.06 ± 0.01	0.01 ± 0.01	0.01 ± 0.00
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	0.00 ± 0.01	0.01 ± 0.01	—	—	—
	$Z \to \nu\nu$	0.18 ± 0.02	0.09 ± 0.01	0.06 ± 0.01	0.01 ± 0.01	0.01 ± 0.00
$ZZ{\to}2\ell2Q$, amcnlo pythia8	Inclusve	0.00 ± 0.01	0.01 ± 0.01	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	0.00 ± 0.01	0.01 ± 0.01	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
$ZZ{\to}2\ell2\nu$, powheg pythia8	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	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	0.15 ± 0.01	0.09 ± 0.01	0.06 ± 0.01	0.01 ± 0.00	0.02 ± 0.00
$ZZ{\to}2Q2\nu$, amcnlo pythia8	Inclusve	0.03 ± 0.01	-0.00 ± 0.01	0.00 ± 0.00	0.00 ± 0.01	-0.00 ± 0.00
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	0.03 ± 0.01	-0.00 ± 0.01	0.00 ± 0.00	0.00 ± 0.01	-0.00 ± 0.00
$t\bar{t} + V$	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	—	—	—
	1 lepton, from W	-0.05 ± 0.05	—	—	—	—
	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
	$Z \to \nu\nu$	1.49 ± 0.04	0.70 ± 0.03	0.27 ± 0.02	0.08 ± 0.01	0.03 ± 0.00
$t\bar{t} + W$	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	—	—	—	—
	1 lepton, from W	-0.05 ± 0.05	—	—	—	—
	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
	$Z \to \nu\nu$	—	—	—	—	—
$t\bar{t} + W{\to}\ell\nu$, amcnlo pythia8	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	—	—	—	—
	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
	$Z \to \nu\nu$	—	—	—	—	—

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Table 8 – continued from previous page

Sample	Classification	≥4jets MT2W≥ 200 250 < MET < 350	≥4jets MT2W≥ 200 350 < MET < 450	≥4jets MT2W≥ 200 450 < MET < 550	≥4jets MT2W≥ 200 550 < MET < 650	≥4jets MT2W≥ 200 MET > 650
$t\bar{t} + W \to QQ$, amcnlo pythia8	Inclusve	0.20 ± 0.10	0.12 ± 0.06	—	-0.02 ± 0.05	0.01 ± 0.01
	1 lepton	0.03 ± 0.03	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	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
	$Z \to \nu\nu$	—	—	—	—	—
$t\bar{t} + Z$	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	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	0.01 ± 0.00	0.00 ± 0.00	—	—	—
	≥ 2 leptons	0.02 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	—	—
	$Z \to \nu\nu$	1.49 ± 0.04	0.70 ± 0.03	0.27 ± 0.02	0.08 ± 0.01	0.03 ± 0.00
$t\bar{t} + Z$, madgraph	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	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	0.01 ± 0.00	0.00 ± 0.00	—	—	—
	≥ 2 leptons	0.02 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	—	—
	$Z \to \nu\nu$	1.49 ± 0.04	0.70 ± 0.03	0.27 ± 0.02	0.08 ± 0.01	0.03 ± 0.00
$t\bar{t} + Z \to QQ$, amcnlo pythia8	Inclusve	0.22 ± 0.12	0.02 ± 0.05	—	—	-0.04 ± 0.03
	1 lepton	0.04 ± 0.04	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	0.04 ± 0.04	—	—	—	—
	≥ 2 leptons	0.18 ± 0.12	0.02 ± 0.05	—	—	-0.04 ± 0.03
	$Z \to \nu\nu$	—	—	—	—	—
$t\bar{t} + Z \to 2\ell 2\nu$, amcnlo pythia8	Inclusve	1.74 ± 0.50	1.49 ± 0.31	0.12 ± 0.16	0.18 ± 0.09	0.10 ± 0.05
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	0.01 ± 0.05	0.00 ± 0.05	—	—	—
	$Z \to \nu\nu$	1.73 ± 0.50	1.49 ± 0.31	0.12 ± 0.16	0.18 ± 0.09	0.10 ± 0.05

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Sample	Classification	2jets modTopness$\geq$ 6.4 $250 < MET < 350$	2jets modTopness$\geq$ 6.4 $350 < MET < 450$	2jets modTopness$\geq$ 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
All Background	1 lepton, from W	5.43 ± 1.40	0.81 ± 0.16	0.43 ± 0.14
	1 lepton, from t	2.60 ± 0.66	0.59 ± 0.24	—
	$\geq$ 2 leptons	266.17 ± 19.61	45.94 ± 7.59	9.78 ± 1.10
	$Z \to \nu\nu$	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	—
$t\bar{t}$	1 lepton, from W	—	—	—
	1 lepton, from t	2.50 ± 0.65	0.59 ± 0.24	—
	$\geq$ 2 leptons	226.43 ± 3.78	33.16 ± 1.39	7.18 ± 0.70
	$Z \to \nu\nu$	—	—	—
	Inclusve	1.45 ± 0.60	0.18 ± 0.18	—
	1 lepton	1.45 ± 0.60	0.18 ± 0.18	—
$t\bar{t}$, single lepFromT, madgraph pythia8	1 lepton, from W	—	—	—
	1 lepton, from t	1.45 ± 0.60	0.18 ± 0.18	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
	Inclusve	1.04 ± 0.26	0.41 ± 0.16	—
	1 lepton	1.04 ± 0.26	0.41 ± 0.16	—
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	1 lepton, from W	—	—	—
	1 lepton, from t	1.04 ± 0.26	0.41 ± 0.16	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
	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	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	226.43 ± 3.78	33.16 ± 1.39	7.18 ± 0.70
	$Z \to \nu\nu$	—	—	—
	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	—	—	—
	1 lepton, from t	0.10 ± 0.10	—	—
	$\geq$ 2 leptons	13.98 ± 2.97	3.82 ± 1.46	1.24 ± 0.72
	$Z \to \nu\nu$	—	—	—
	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	—	—	—
	$\geq$ 2 leptons	13.98 ± 2.97	3.82 ± 1.46	1.24 ± 0.72
	$Z \to \nu\nu$	—	—	—
	Inclusve	—	—	—
	1 lepton	—	—	—
single t, $t - W$-channel, powheg pythia8	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
	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	—	—	—
	$\geq$ 2 leptons	13.98 ± 2.97	3.82 ± 1.46	1.24 ± 0.72
	$Z \to \nu\nu$	—	—	—
	Inclusve	0.10 ± 0.10	—	—
	1 lepton	0.10 ± 0.10	—	—
single t non $t - W$-channel	1 lepton, from W	—	—	—
	1 lepton, from t	0.10 ± 0.10	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—

Table 9 – continued from previous page

Sample	Classification	2jets modTopness$\geq$ 6.4 $250 < MET < 350$	2jets modTopness$\geq$ 6.4 $350 < MET < 450$	2jets modTopness$\geq$ 6.4 $MET > 450$
single t, s-channel, amcnlo pythia8	Inclusve	0.10 ± 0.10	—	—
	1 lepton	0.10 ± 0.10	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	0.10 ± 0.10	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
V+Jets	Inclusve	25.85 ± 19.05	8.04 ± 7.31	0.41 ± 0.14
	1 lepton	5.40 ± 1.39	0.73 ± 0.16	0.41 ± 0.14
	1 lepton, from W	5.40 ± 1.39	0.73 ± 0.16	0.41 ± 0.14
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	20.45 ± 19.00	7.31 ± 7.31	—
	$Z \to \nu\nu$	—	—	—
DY+Jets$\to \ell\ell$	Inclusve	20.45 ± 19.00	7.31 ± 7.31	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	20.45 ± 19.00	7.31 ± 7.31	—
	$Z \to \nu\nu$	—	—	—
DY+Jets$\to \ell\ell$, M10to50, amcnlo pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
DY+Jets$\to \ell\ell$, M50, amcnlo pythia8	Inclusve	20.45 ± 19.00	7.31 ± 7.31	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	20.45 ± 19.00	7.31 ± 7.31	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$	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 ± 0.14
	1 lepton, from W	5.40 ± 1.39	0.73 ± 0.16	0.41 ± 0.14
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $100 < HT < 200$, madgraph pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $200 < HT < 400$, madgraph pythia8	Inclusve	0.44 ± 0.44	—	—
	1 lepton	0.44 ± 0.44	—	—
	1 lepton, from W	0.44 ± 0.44	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $400 < HT < 600$, madgraph pythia8	Inclusve	2.10 ± 1.25	—	—
	1 lepton	2.10 ± 1.25	—	—
	1 lepton, from W	2.10 ± 1.25	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets$\to \ell\nu$, $600 < HT < 800$, madgraph pythia8	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
	1 lepton, from W	1.73 ± 0.40	0.06 ± 0.06	0.06 ± 0.06
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—

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Table 9 – continued from previous page

Sample	Classification	2jets modTopness≥ 6.4 $250 < MET < 350$	2jets modTopness≥ 6.4 $350 < MET < 450$	2jets modTopness≥ 6.4 $MET > 450$
W+Jets→ $\ell\nu$, $800 < HT < 1200$, madgraph pythia8	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
	1 lepton, from W	1.13 ± 0.19	0.59 ± 0.12	0.21 ± 0.07
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets→ $\ell\nu$, $1200 < HT < 2500$, madgraph pythia8	Inclusve	—	0.08 ± 0.08	0.14 ± 0.10
	1 lepton	—	0.08 ± 0.08	0.14 ± 0.10
	1 lepton, from W	—	0.08 ± 0.08	0.14 ± 0.10
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets→ $\ell\nu$, $2500 < HT < Inf$, madgraph pythia8	Inclusve	—	—	0.00 ± 0.00
	1 lepton	—	—	0.00 ± 0.00
	1 lepton, from W	—	—	0.00 ± 0.00
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
Rare	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
	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	—
	$\geq$ 2 leptons	5.31 ± 0.74	1.65 ± 0.39	1.36 ± 0.44
	$Z \to \nu\nu$	1.75 ± 0.04	0.45 ± 0.02	0.20 ± 0.02
diBoson	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	0.02 ± 0.02
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	3.85 ± 0.70	1.41 ± 0.37	1.24 ± 0.43
	$Z \to \nu\nu$	0.37 ± 0.02	0.13 ± 0.01	0.09 ± 0.01
WW	Inclusve	2.88 ± 0.67	1.00 ± 0.34	0.76 ± 0.38
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	2.88 ± 0.67	1.00 ± 0.34	0.76 ± 0.38
	$Z \to \nu\nu$	—	—	—
$WW \to 2\ell 2\nu$, powheg	Inclusve	2.88 ± 0.67	1.00 ± 0.34	0.76 ± 0.38
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	2.88 ± 0.67	1.00 ± 0.34	0.76 ± 0.38
	$Z \to \nu\nu$	—	—	—
$WW \to \ell\nu qq$, powheg	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
WZ	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
	1 lepton, from W	0.03 ± 0.04	0.08 ± 0.04	0.02 ± 0.02
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.88 ± 0.20	0.42 ± 0.15	0.43 ± 0.20
	$Z \to \nu\nu$	—	—	—
$WZ \to 3\ell\nu$, powheg pythia8	Inclusve	0.78 ± 0.20	0.37 ± 0.15	0.42 ± 0.20
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.78 ± 0.20	0.37 ± 0.15	0.42 ± 0.20
	$Z \to \nu\nu$	—	—	—

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Table 9 – continued from previous page

Sample	Classification	2jets modTopness≥ 6.4 250 < MET < 350	2jets modTopness≥ 6.4 350 < MET < 450	2jets modTopness≥ 6.4 MET > 450
WZ→2ℓ2Q, amcnlo pythia8	Inclusve	0.11 ± 0.03	0.06 ± 0.03	0.01 ± 0.01
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	0.11 ± 0.03	0.06 ± 0.03	0.01 ± 0.01
	Z → νν	—	—	—
WZ→ℓν2Q, amcnlo pythia8	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
	1 lepton, from W	0.03 ± 0.04	0.08 ± 0.04	0.02 ± 0.02
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	Z → νν	—	—	—
WZ→1ℓ3ν, amcnlo pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	Z → νν	—	—	—
ZZ	Inclusve	0.47 ± 0.04	0.12 ± 0.02	0.14 ± 0.02
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	0.09 ± 0.03	-0.01 ± 0.01	0.05 ± 0.02
	Z → νν	0.37 ± 0.02	0.13 ± 0.01	0.09 ± 0.01
ZZ→2ℓ2Q, amcnlo pythia8	Inclusve	0.09 ± 0.03	-0.01 ± 0.01	0.05 ± 0.02
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	0.09 ± 0.03	-0.01 ± 0.01	0.05 ± 0.02
	Z → νν	—	—	—
ZZ→2ℓ2ν, powheg pythia8	Inclusve	0.37 ± 0.02	0.13 ± 0.01	0.09 ± 0.01
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	Z → νν	0.37 ± 0.02	0.13 ± 0.01	0.09 ± 0.01
ZZ→2Q2ν, amcnlo pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	Z → νν	—	—	—
tt̄ + V	Inclusve	2.83 ± 0.23	0.55 ± 0.11	0.22 ± 0.08
	1 lepton	0.00 ± 0.00	0.00 ± 0.00	—
	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 → νν	1.37 ± 0.03	0.32 ± 0.01	0.11 ± 0.01
tt̄ + W	Inclusve	1.24 ± 0.23	0.19 ± 0.11	0.09 ± 0.08
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	1.24 ± 0.23	0.19 ± 0.11	0.09 ± 0.08
	Z → νν	—	—	—
tt̄ + W→ℓν, amcnlo pythia8	Inclusve	1.04 ± 0.22	0.16 ± 0.11	0.03 ± 0.07
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	1.04 ± 0.22	0.16 ± 0.11	0.03 ± 0.07
	Z → νν	—	—	—

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Table 9 – continued from previous page

Sample	Classification	2jets modTopness$\geq$ 6.4 $250 < MET < 350$	2jets modTopness$\geq$ 6.4 $350 < MET < 450$	2jets modTopness$\geq$ 6.4 $MET > 450$
$t\bar{t} + W \rightarrow QQ$, amcnlo pythia8	Inclusve	0.21 ± 0.07	0.03 ± 0.02	0.06 ± 0.04
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.21 ± 0.07	0.03 ± 0.02	0.06 ± 0.04
	$Z \rightarrow \nu\nu$	—	—	—
$t\bar{t} + Z$	Inclusve	1.59 ± 0.03	0.36 ± 0.01	0.13 ± 0.01
	1 lepton	0.00 ± 0.00	0.00 ± 0.00	—
	1 lepton, from W	—	—	—
	1 lepton, from t	0.00 ± 0.00	0.00 ± 0.00	—
	$\geq$ 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
$t\bar{t} + Z$, madgraph	Inclusve	1.59 ± 0.03	0.36 ± 0.01	0.13 ± 0.01
	1 lepton	0.00 ± 0.00	0.00 ± 0.00	—
	1 lepton, from W	—	—	—
	1 lepton, from t	0.00 ± 0.00	0.00 ± 0.00	—
	$\geq$ 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
$t\bar{t} + Z \rightarrow QQ$, amcnlo pythia8	Inclusve	0.08 ± 0.08	0.00 ± 0.03	0.03 ± 0.02
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 2 leptons	0.08 ± 0.08	0.00 ± 0.03	0.03 ± 0.02
	$Z \rightarrow \nu\nu$	—	—	—
$t\bar{t} + Z \rightarrow 2\ell2\nu$, amcnlo pythia8	Inclusve	1.14 ± 0.22	0.28 ± 0.11	0.16 ± 0.06
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	$\geq$ 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

Sample	Classification	3jets MT2W≥200 250 < MET < 350	3jets MT2W≥200 350 < MET < 450	3jets MT2W≥200 450 < MET < 550	3jets MT2W≥200 MET > 550
Data, single e/μ, MET	Inclusve	135.00 ± 11.62	48.00 ± 6.93	18.00 ± 4.24	6.00 ± 2.45
All Background	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
	1 lepton, from W	3.39 ± 0.57	2.02 ± 0.99	0.48 ± 0.15	0.46 ± 0.29
	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
	$Z \to \nu\nu$	1.50 ± 0.03	0.55 ± 0.06	0.12 ± 0.01	0.08 ± 0.04
$t\bar{t}$	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
	1 lepton, from W	—	—	—	—
	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
	$Z \to \nu\nu$	—	—	—	—
$t\bar{t}$, single lepFromT, madgraph pythia8	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
	1 lepton, from W	—	—	—	—
	1 lepton, from t	4.59 ± 1.28	0.48 ± 0.34	—	0.14 ± 0.14
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	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	—	—	—	—
	1 lepton, from t	4.37 ± 0.62	0.75 ± 0.22	0.33 ± 0.14	0.09 ± 0.07
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
$t\bar{t}$, diLepton, madgraph pythia8, ext1	Inclusve	131.55 ± 3.15	30.00 ± 1.43	6.28 ± 0.61	2.31 ± 0.34
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	131.55 ± 3.15	30.00 ± 1.43	6.28 ± 0.61	2.31 ± 0.34
	$Z \to \nu\nu$	—	—	—	—
single t	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	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	12.42 ± 2.92	4.50 ± 1.62	0.48 ± 0.48	1.38 ± 0.80
	$Z \to \nu\nu$	—	—	—	—
single t $t - W$-channel	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	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	12.42 ± 2.92	4.50 ± 1.62	0.48 ± 0.48	1.38 ± 0.80
	$Z \to \nu\nu$	—	—	—	—
single t, $t - W$-channel, powheg pythia8	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
single $\bar{t}$, $t - W$-channel, powheg pythia8	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	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	12.42 ± 2.92	4.50 ± 1.62	0.48 ± 0.48	1.38 ± 0.80
	$Z \to \nu\nu$	—	—	—	—
single t non $t - W$-channel	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—

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Table 10 – continued from previous page

Sample	Classification	3jets MT2W≥200 $250 < MET < 350$	3jets MT2W≥200 $350 < MET < 450$	3jets MT2W≥200 $450 < MET < 550$	3jets MT2W≥200 $MET > 550$
single t, s-channel, amcnlo pythia8	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
V+Jets	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
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	5.36 ± 5.36	—	4.07 ± 4.07	—
	$Z \to \nu\nu$	—	—	—	—
DY+Jets$\to \ell\ell$	Inclusve	5.36 ± 5.36	—	4.07 ± 4.07	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	5.36 ± 5.36	—	4.07 ± 4.07	—
	$Z \to \nu\nu$	—	—	—	—
DY+Jets$\to \ell\ell$, M10to50, amcnlo pythia8	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
DY+Jets$\to \ell\ell$, M50, amcnlo pythia8	Inclusve	5.36 ± 5.36	—	4.07 ± 4.07	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	5.36 ± 5.36	—	4.07 ± 4.07	—
	$Z \to \nu\nu$	—	—	—	—
W+Jets$\to \ell\nu$	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
	1 lepton, from W	3.27 ± 0.57	1.01 ± 0.19	0.47 ± 0.15	0.46 ± 0.29
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
W+Jets$\to \ell\nu$, $100 < HT < 200$, madgraph pythia8	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
W+Jets$\to \ell\nu$, $200 < HT < 400$, madgraph pythia8	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
W+Jets$\to \ell\nu$, $400 < HT < 600$, madgraph pythia8	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
W+Jets$\to \ell\nu$, $600 < HT < 800$, madgraph pythia8	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
	1 lepton, from W	1.23 ± 0.36	0.14 ± 0.10	—	0.04 ± 0.04
	1 lepton, from t	—	—	—	—
	$\geq$ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—

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Table 10 – continued from previous page

Sample	Classification	3jets MT2W≥200 $250 < MET < 350$	3jets MT2W≥200 $350 < MET < 450$	3jets MT2W≥200 $450 < MET < 550$	3jets MT2W≥200 $MET > 550$
W+Jets→ $\ell\nu$, $800 < HT < 1200$, madgraph pythia8	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
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
W+Jets→ $\ell\nu$, $1200 < HT < 2500$, madgraph pythia8	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
	1 lepton, from W	0.46 ± 0.37	—	0.15 ± 0.11	0.34 ± 0.28
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
W+Jets→ $\ell\nu$, $2500 < HT < Inf$, madgraph pythia8	Inclusve	—	—	—	0.04 ± 0.02
	1 lepton	—	—	—	0.04 ± 0.02
	1 lepton, from W	—	—	—	0.04 ± 0.02
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
Rare	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	—
	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
	$Z \to \nu\nu$	1.50 ± 0.03	0.55 ± 0.06	0.12 ± 0.01	0.08 ± 0.04
diBoson	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	—
	1 lepton, from W	0.12 ± 0.06	0.04 ± 0.03	0.02 ± 0.02	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	3.84 ± 0.74	1.58 ± 0.43	0.91 ± 0.39	0.65 ± 0.32
	$Z \to \nu\nu$	0.21 ± 0.02	0.15 ± 0.06	0.03 ± 0.01	0.06 ± 0.04
WW	Inclusve	2.64 ± 0.69	1.16 ± 0.40	0.82 ± 0.39	0.49 ± 0.31
	1 lepton	—	—	—	—
	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
	$Z \to \nu\nu$	—	—	—	—
$WW \to 2\ell2\nu$, powheg	Inclusve	2.64 ± 0.69	1.16 ± 0.40	0.82 ± 0.39	0.49 ± 0.31
	1 lepton	—	—	—	—
	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
	$Z \to \nu\nu$	—	—	—	—
$WW \to \ell\nu qq$, powheg	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
WZ	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	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	1.13 ± 0.25	0.40 ± 0.14	0.09 ± 0.05	0.15 ± 0.08
	$Z \to \nu\nu$	—	0.05 ± 0.05	—	0.04 ± 0.04
$WZ \to 3\ell\nu$, powheg pythia8	Inclusve	1.06 ± 0.25	0.38 ± 0.14	0.07 ± 0.05	0.14 ± 0.08
	1 lepton	—	—	—	—
	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
	$Z \to \nu\nu$	—	—	—	—

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Table 10 – continued from previous page

Sample	Classification	3jets MT2W≥200 $250 < MET < 350$	3jets MT2W≥200 $350 < MET < 450$	3jets MT2W≥200 $450 < MET < 550$	3jets MT2W≥200 $MET > 550$
$WZ{\to}2\ell 2Q$, amcnlo pythia8	Inclusve	0.07 ± 0.05	0.02 ± 0.02	0.02 ± 0.01	0.01 ± 0.01
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	0.07 ± 0.05	0.02 ± 0.02	0.02 ± 0.01	0.01 ± 0.01
	$Z \to \nu\nu$	—	—	—	—
$WZ{\to}\ell\nu 2Q$, amcnlo pythia8	Inclusve	0.12 ± 0.06	0.04 ± 0.03	0.02 ± 0.02	—
	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	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
$WZ{\to}1\ell 3\nu$, amcnlo pythia8	Inclusve	—	0.05 ± 0.05	—	0.04 ± 0.04
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	0.05 ± 0.05	—	0.04 ± 0.04
ZZ	Inclusve	0.27 ± 0.04	0.11 ± 0.02	0.04 ± 0.01	0.02 ± 0.01
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	0.07 ± 0.04	0.01 ± 0.02	0.01 ± 0.01	0.00 ± 0.01
	$Z \to \nu\nu$	0.21 ± 0.02	0.10 ± 0.01	0.03 ± 0.01	0.02 ± 0.01
$ZZ{\to}2\ell 2Q$, amcnlo pythia8	Inclusve	0.07 ± 0.04	0.01 ± 0.02	0.01 ± 0.01	0.00 ± 0.01
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	0.07 ± 0.04	0.01 ± 0.02	0.01 ± 0.01	0.00 ± 0.01
	$Z \to \nu\nu$	—	—	—	—
$ZZ{\to}2\ell 2\nu$, powheg pythia8	Inclusve	0.21 ± 0.02	0.10 ± 0.01	0.03 ± 0.01	0.02 ± 0.01
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	0.21 ± 0.02	0.10 ± 0.01	0.03 ± 0.01	0.02 ± 0.01
$ZZ{\to}2Q2\nu$, amcnlo pythia8	Inclusve	—	—	—	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—
$t\bar{t} + V$	Inclusve	3.71 ± 0.32	1.02 ± 0.17	0.23 ± 0.07	0.13 ± 0.04
	1 lepton	0.03 ± 0.01	0.01 ± 0.00	0.00 ± 0.00	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	0.03 ± 0.01	0.01 ± 0.00	0.00 ± 0.00	—
	≥ 2 leptons	2.39 ± 0.32	0.62 ± 0.17	0.14 ± 0.07	0.10 ± 0.04
	$Z \to \nu\nu$	1.29 ± 0.03	0.40 ± 0.02	0.09 ± 0.01	0.03 ± 0.00
$t\bar{t} + W$	Inclusve	1.79 ± 0.31	0.48 ± 0.17	0.10 ± 0.07	0.09 ± 0.04
	1 lepton	0.01 ± 0.01	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	0.01 ± 0.01	—	—	—
	≥ 2 leptons	1.78 ± 0.31	0.48 ± 0.17	0.10 ± 0.07	0.09 ± 0.04
	$Z \to \nu\nu$	—	—	—	—
$t\bar{t} + W{\to}\ell\nu$, amcnlo pythia8	Inclusve	1.42 ± 0.30	0.45 ± 0.17	0.02 ± 0.06	0.10 ± 0.04
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	1.42 ± 0.30	0.45 ± 0.17	0.02 ± 0.06	0.10 ± 0.04
	$Z \to \nu\nu$	—	—	—	—

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Table 10 – continued from previous page

Sample	Classification	3jets MT2W≥200 250 < MET < 350	3jets MT2W≥200 350 < MET < 450	3jets MT2W≥200 450 < MET < 550	3jets MT2W≥200 MET > 550
$t\bar{t} + W \rightarrow QQ$, amcnlo pythia8	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	—	—	—	—
	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
	$Z \rightarrow \nu\nu$	—	—	—	—
$t\bar{t} + Z$	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	—
	1 lepton, from W	—	—	—	—
	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
$t\bar{t} + Z$, madgraph	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	—
	1 lepton, from W	—	—	—	—
	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
$t\bar{t} + Z \rightarrow QQ$, amcnlo pythia8	Inclusve	0.45 ± 0.13	0.07 ± 0.05	0.08 ± 0.04	—
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 2 leptons	0.45 ± 0.13	0.07 ± 0.05	0.08 ± 0.04	—
	$Z \rightarrow \nu\nu$	—	—	—	—
$t\bar{t} + Z \rightarrow 2\ell 2\nu$, amcnlo pythia8	Inclusve	2.18 ± 0.31	0.55 ± 0.17	0.09 ± 0.07	0.13 ± 0.06
	1 lepton	—	—	—	—
	1 lepton, from W	—	—	—	—
	1 lepton, from t	—	—	—	—
	≥ 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

Sample	Classification	≥4jets MT2W< 200 250 < MET < 350	≥4jets MT2W< 200 350 < MET < 450	≥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	594.79 ± 6.97	109.09 ± 2.82	31.99 ± 1.40
	1 lepton	17.80 ± 1.88	4.54 ± 0.92	1.71 ± 0.44
	1 lepton, from W	2.48 ± 0.83	0.48 ± 0.18	0.12 ± 0.07
	1 lepton, from t	15.32 ± 1.69	4.06 ± 0.90	1.60 ± 0.44
	≥ 2 leptons	574.65 ± 6.71	104.09 ± 2.67	30.17 ± 1.33
	$Z \to \nu\nu$	2.33 ± 0.04	0.45 ± 0.02	0.11 ± 0.01
$t\bar{t}$	Inclusve	575.98 ± 6.59	105.76 ± 2.75	30.66 ± 1.33
	1 lepton	15.23 ± 1.69	4.00 ± 0.90	1.61 ± 0.44
	1 lepton, from W	—	—	—
	1 lepton, from t	15.23 ± 1.69	4.00 ± 0.90	1.61 ± 0.44
	≥ 2 leptons	560.75 ± 6.37	101.75 ± 2.59	29.05 ± 1.26
	$Z \to \nu\nu$	—	—	—
$t\bar{t}$, single lepFromT, madgraph pythia8	Inclusve	7.59 ± 1.50	2.16 ± 0.83	0.71 ± 0.36
	1 lepton	7.59 ± 1.50	2.16 ± 0.83	0.71 ± 0.36
	1 lepton, from W	—	—	—
	1 lepton, from t	7.59 ± 1.50	2.16 ± 0.83	0.71 ± 0.36
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	Inclusve	7.63 ± 0.78	1.84 ± 0.35	0.90 ± 0.25
	1 lepton	7.63 ± 0.78	1.84 ± 0.35	0.90 ± 0.25
	1 lepton, from W	—	—	—
	1 lepton, from t	7.63 ± 0.78	1.84 ± 0.35	0.90 ± 0.25
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
$t\bar{t}$, diLepton, madgraph pythia8, ext1	Inclusve	560.75 ± 6.37	101.75 ± 2.59	29.05 ± 1.26
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	560.75 ± 6.37	101.75 ± 2.59	29.05 ± 1.26
	$Z \to \nu\nu$	—	—	—
single t	Inclusve	7.18 ± 2.12	0.55 ± 0.55	0.41 ± 0.41
	1 lepton	0.62 ± 0.62	—	—
	1 lepton, from W	0.62 ± 0.62	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	6.56 ± 2.03	0.55 ± 0.55	0.41 ± 0.41
	$Z \to \nu\nu$	—	—	—
single t $t - W$-channel	Inclusve	7.18 ± 2.12	0.55 ± 0.55	0.41 ± 0.41
	1 lepton	0.62 ± 0.62	—	—
	1 lepton, from W	0.62 ± 0.62	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	6.56 ± 2.03	0.55 ± 0.55	0.41 ± 0.41
	$Z \to \nu\nu$	—	—	—
single t, $t - W$-channel, powheg pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
single $\bar{t}$, $t - W$-channel, powheg pythia8	Inclusve	7.18 ± 2.12	0.55 ± 0.55	0.41 ± 0.41
	1 lepton	0.62 ± 0.62	—	—
	1 lepton, from W	0.62 ± 0.62	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	6.56 ± 2.03	0.55 ± 0.55	0.41 ± 0.41
	$Z \to \nu\nu$	—	—	—
single t non $t - W$-channel	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—

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Table 11 – continued from previous page

Sample	Classification	≥4jets MT2W< 200 $250 < MET < 350$	≥4jets MT2W< 200 $350 < MET < 450$	≥4jets MT2W< 200 $MET > 450$
single t, s-channel, amcnlo pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
V+Jets	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
	1 lepton, from W	1.74 ± 0.55	0.48 ± 0.18	0.12 ± 0.07
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
DY+Jets→ $\ell\ell$	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
DY+Jets→ $\ell\ell$, M10to50, amcnlo pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
DY+Jets→ $\ell\ell$, M50, amcnlo pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets→ $\ell\nu$	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
	1 lepton, from W	1.74 ± 0.55	0.48 ± 0.18	0.12 ± 0.07
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets→ $\ell\nu$, $100 < HT < 200$, madgraph pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets→ $\ell\nu$, $200 < HT < 400$, madgraph pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets→ $\ell\nu$, $400 < HT < 600$, madgraph pythia8	Inclusve	0.50 ± 0.50	—	—
	1 lepton	0.50 ± 0.50	—	—
	1 lepton, from W	0.50 ± 0.50	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets→ $\ell\nu$, $600 < HT < 800$, madgraph pythia8	Inclusve	0.43 ± 0.18	—	—
	1 lepton	0.43 ± 0.18	—	—
	1 lepton, from W	0.43 ± 0.18	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—

Table 11 – continued from previous page

Sample	Classification	≥4jets MT2W< 200 250 < MET < 350	≥4jets MT2W< 200 350 < MET < 450	≥4jets MT2W< 200 MET > 450
W+Jets→ $\ell\nu$, 800 < HT < 1200, madgraph pythia8	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
	1 lepton, from W	0.81 ± 0.14	0.14 ± 0.06	0.05 ± 0.03
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets→ $\ell\nu$, 1200 < HT < 2500, madgraph pythia8	Inclusve	—	0.34 ± 0.17	0.07 ± 0.07
	1 lepton	—	0.34 ± 0.17	0.07 ± 0.07
	1 lepton, from W	—	0.34 ± 0.17	0.07 ± 0.07
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
W+Jets→ $\ell\nu$, 2500 < HT < Inf, madgraph pythia8	Inclusve	0.01 ± 0.00	—	—
	1 lepton	0.01 ± 0.00	—	—
	1 lepton, from W	0.01 ± 0.00	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
Rare	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
	1 lepton, from W	0.12 ± 0.05	—	—
	1 lepton, from t	0.09 ± 0.04	0.06 ± 0.03	-0.01 ± 0.02
	≥ 2 leptons	7.34 ± 0.63	1.79 ± 0.29	0.71 ± 0.15
	$Z \to \nu\nu$	2.33 ± 0.04	0.45 ± 0.02	0.11 ± 0.01
diBoson	Inclusve	1.66 ± 0.37	0.35 ± 0.15	0.09 ± 0.05
	1 lepton	0.08 ± 0.04	—	—
	1 lepton, from W	0.08 ± 0.04	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	1.52 ± 0.36	0.34 ± 0.15	0.08 ± 0.05
	$Z \to \nu\nu$	0.06 ± 0.01	0.02 ± 0.00	0.01 ± 0.00
WW	Inclusve	0.87 ± 0.31	0.18 ± 0.13	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	0.87 ± 0.31	0.18 ± 0.13	—
	$Z \to \nu\nu$	—	—	—
WW→2ℓ2ν, powheg	Inclusve	0.87 ± 0.31	0.18 ± 0.13	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	0.87 ± 0.31	0.18 ± 0.13	—
	$Z \to \nu\nu$	—	—	—
WW→$\ell\nu qq$, powheg	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
WZ	Inclusve	0.67 ± 0.19	0.15 ± 0.08	0.08 ± 0.05
	1 lepton	0.08 ± 0.04	—	—
	1 lepton, from W	0.08 ± 0.04	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	0.59 ± 0.18	0.15 ± 0.08	0.08 ± 0.05
	$Z \to \nu\nu$	—	—	—
WZ→3$\ell\nu$, powheg pythia8	Inclusve	0.57 ± 0.18	0.13 ± 0.08	0.07 ± 0.05
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	0.57 ± 0.18	0.13 ± 0.08	0.07 ± 0.05
	$Z \to \nu\nu$	—	—	—

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Table 11 – continued from previous page

Sample	Classification	≥4jets MT2W< 200 250 < MET < 350	≥4jets MT2W< 200 350 < MET < 450	≥4jets MT2W< 200 MET > 450
$WZ{\to}2\ell2Q$, amcnlo pythia8	Inclusve	0.03 ± 0.02	0.02 ± 0.02	0.01 ± 0.01
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	0.03 ± 0.02	0.02 ± 0.02	0.01 ± 0.01
	$Z \to \nu\nu$	—	—	—
$WZ{\to}\ell\nu2Q$, amcnlo pythia8	Inclusve	0.08 ± 0.04	—	—
	1 lepton	0.08 ± 0.04	—	—
	1 lepton, from W	0.08 ± 0.04	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
$WZ{\to}1\ell3\nu$, amcnlo pythia8	Inclusve	—	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	—	—	—
ZZ	Inclusve	0.12 ± 0.02	0.02 ± 0.01	0.01 ± 0.00
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	0.06 ± 0.02	0.01 ± 0.01	—
	$Z \to \nu\nu$	0.06 ± 0.01	0.02 ± 0.00	0.01 ± 0.00
$ZZ{\to}2\ell2Q$, amcnlo pythia8	Inclusve	0.06 ± 0.02	0.01 ± 0.01	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	0.06 ± 0.02	0.01 ± 0.01	—
	$Z \to \nu\nu$	—	—	—
$ZZ{\to}2\ell2\nu$, powheg pythia8	Inclusve	0.07 ± 0.01	0.02 ± 0.00	0.01 ± 0.00
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	0.07 ± 0.01	0.02 ± 0.00	0.01 ± 0.00
$ZZ{\to}2Q2\nu$, amcnlo pythia8	Inclusve	-0.00 ± 0.00	—	—
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	—	—	—
	$Z \to \nu\nu$	-0.00 ± 0.00	—	—
$t\bar{t} + V$	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
	1 lepton, from W	0.04 ± 0.03	—	—
	1 lepton, from t	0.09 ± 0.04	0.06 ± 0.03	-0.01 ± 0.02
	≥ 2 leptons	5.82 ± 0.52	1.46 ± 0.25	0.63 ± 0.14
	$Z \to \nu\nu$	2.27 ± 0.04	0.43 ± 0.02	0.10 ± 0.01
$t\bar{t} + W$	Inclusve	4.96 ± 0.52	1.34 ± 0.25	0.58 ± 0.14
	1 lepton	0.10 ± 0.05	0.05 ± 0.03	-0.02 ± 0.02
	1 lepton, from W	0.04 ± 0.03	—	—
	1 lepton, from t	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
	$Z \to \nu\nu$	—	—	—
$t\bar{t} + W{\to}\ell\nu$, amcnlo pythia8	Inclusve	3.18 ± 0.45	0.92 ± 0.22	0.36 ± 0.11
	1 lepton	0.04 ± 0.03	—	—
	1 lepton, from W	0.04 ± 0.03	—	—
	1 lepton, from t	—	—	—
	≥ 2 leptons	3.14 ± 0.45	0.92 ± 0.22	0.36 ± 0.11
	$Z \to \nu\nu$	—	—	—

Table 11 – continued from previous page

Sample	Classification	≥4jets MT2W< 200 250 < MET < 350	≥4jets MT2W< 200 350 < MET < 450	≥4jets MT2W< 200 MET > 450
	Inclusve	1.78 ± 0.25	0.42 ± 0.13	0.22 ± 0.08
	1 lepton	0.06 ± 0.04	0.05 ± 0.03	-0.02 ± 0.02
	1 lepton, from W	—	—	—
$t\bar{t} + W \to QQ$, amcnlo pythia8	1 lepton, from t	0.06 ± 0.04	0.05 ± 0.03	-0.02 ± 0.02
	≥ 2 leptons	1.72 ± 0.25	0.38 ± 0.13	0.24 ± 0.08
	$Z \to \nu\nu$	—	—	—
	Inclusve	3.27 ± 0.05	0.60 ± 0.02	0.13 ± 0.01
	1 lepton	0.03 ± 0.00	0.01 ± 0.00	0.00 ± 0.00
	1 lepton, from W	—	—	—
$t\bar{t} + Z$	1 lepton, from t	0.03 ± 0.00	0.01 ± 0.00	0.00 ± 0.00
	≥ 2 leptons	0.96 ± 0.03	0.16 ± 0.01	0.03 ± 0.00
	$Z \to \nu\nu$	2.27 ± 0.04	0.43 ± 0.02	0.10 ± 0.01
	Inclusve	3.27 ± 0.05	0.60 ± 0.02	0.13 ± 0.01
	1 lepton	0.03 ± 0.00	0.01 ± 0.00	0.00 ± 0.00
	1 lepton, from W	—	—	—
$t\bar{t} + Z$, madgraph	1 lepton, from t	0.03 ± 0.00	0.01 ± 0.00	0.00 ± 0.00
	≥ 2 leptons	0.96 ± 0.03	0.16 ± 0.01	0.03 ± 0.00
	$Z \to \nu\nu$	2.27 ± 0.04	0.43 ± 0.02	0.10 ± 0.01
	Inclusve	2.18 ± 0.39	0.33 ± 0.16	0.30 ± 0.08
	1 lepton	0.13 ± 0.08	0.03 ± 0.03	—
	1 lepton, from W	—	—	—
$t\bar{t} + Z \to QQ$, amcnlo pythia8	1 lepton, from t	0.13 ± 0.08	0.03 ± 0.03	—
	≥ 2 leptons	2.04 ± 0.38	0.30 ± 0.16	0.30 ± 0.08
	$Z \to \nu\nu$	—	—	—
	Inclusve	2.16 ± 0.45	0.88 ± 0.19	0.19 ± 0.10
	1 lepton	—	—	—
	1 lepton, from W	—	—	—
$t\bar{t} + Z \to 2\ell2\nu$, amcnlo pythia8	1 lepton, from t	—	—	—
	≥ 2 leptons	1.56 ± 0.39	0.63 ± 0.13	0.19 ± 0.08
	$Z \to \nu\nu$	0.60 ± 0.23	0.25 ± 0.14	-0.00 ± 0.05

Sample	Classification	≥4jets MT2W≥ 200 250 < MET < 350	≥4jets MT2W≥ 200 350 < MET < 450	≥4jets MT2W≥ 200 450 < MET < 550	≥4jets MT2W≥ 200 550 < MET < 650	≥4jets MT2W≥ 200 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
All Background	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 ± 0.25
	1 lepton, from t	15.59 ± 1.72	5.13 ± 0.98	2.03 ± 0.46	0.75 ± 0.37	0.18 ± 0.13
	≥ 2 leptons	148.45 ± 10.42	42.14 ± 5.20	14.19 ± 1.19	6.06 ± 1.22	2.40 ± 0.44
	$Z \rightarrow \nu\nu$	1.11 ± 0.06	0.34 ± 0.02	0.15 ± 0.05	0.04 ± 0.01	0.06 ± 0.04
$t\bar{t}$	Inclusve	157.90 ± 4.13	44.51 ± 1.99	15.52 ± 1.25	4.21 ± 0.64	1.99 ± 0.36
	1 lepton	15.71 ± 1.71	5.11 ± 0.98	1.99 ± 0.46	0.75 ± 0.37	0.18 ± 0.13
	1 lepton, from W	—	—	—	—	—
	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 ± 0.33
	$Z \rightarrow \nu\nu$	—	—	—	—	—
$t\bar{t}$, single lepFromT, madgraph pythia8	Inclusve	7.64 ± 1.52	2.36 ± 0.88	0.87 ± 0.39	0.51 ± 0.36	0.11 ± 0.11
	1 lepton	7.64 ± 1.52	2.36 ± 0.88	0.87 ± 0.39	0.51 ± 0.36	0.11 ± 0.11
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	7.64 ± 1.52	2.36 ± 0.88	0.87 ± 0.39	0.51 ± 0.36	0.11 ± 0.11
	≥ 2 leptons	—	—	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—	—	—
$t\bar{t}$, single lepFromTbar, madgraph pythia8, ext1	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
	1 lepton, from W	—	—	—	—	—
	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	—	—	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—	—	—
$t\bar{t}$, diLepton, madgraph pythia8, ext1	Inclusve	142.18 ± 3.75	39.40 ± 1.73	13.53 ± 1.16	3.47 ± 0.52	1.81 ± 0.33
	1 lepton	—	—	—	—	—
	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
	$Z \rightarrow \nu\nu$	—	—	—	—	—
single t	Inclusve	8.92 ± 2.40	3.69 ± 1.54	—	2.55 ± 1.16	—
	1 lepton	-0.16 ± 0.16	—	—	0.39 ± 0.39	—
	1 lepton, from W	—	—	—	0.39 ± 0.39	—
	1 lepton, from t	-0.16 ± 0.16	—	—	—	—
	≥ 2 leptons	9.08 ± 2.40	3.69 ± 1.54	—	2.16 ± 1.09	—
	$Z \rightarrow \nu\nu$	—	—	—	—	—
single t $t - W$-channel	Inclusve	9.08 ± 2.40	3.69 ± 1.54	—	2.55 ± 1.16	—
	1 lepton	—	—	—	0.39 ± 0.39	—
	1 lepton, from W	—	—	—	0.39 ± 0.39	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	9.08 ± 2.40	3.69 ± 1.54	—	2.16 ± 1.09	—
	$Z \rightarrow \nu\nu$	—	—	—	—	—
single t, $t - W$-channel, powheg pythia8	Inclusve	—	—	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—	—	—
single $\bar{t}$, $t - W$-channel, powheg pythia8	Inclusve	9.08 ± 2.40	3.69 ± 1.54	—	2.55 ± 1.16	—
	1 lepton	—	—	—	0.39 ± 0.39	—
	1 lepton, from W	—	—	—	0.39 ± 0.39	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	9.08 ± 2.40	3.69 ± 1.54	—	2.16 ± 1.09	—
	$Z \rightarrow \nu\nu$	—	—	—	—	—
single t non $t - W$-channel	Inclusve	-0.16 ± 0.16	—	—	—	—
	1 lepton	-0.16 ± 0.16	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	-0.16 ± 0.16	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \rightarrow \nu\nu$	—	—	—	—	—

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Table 12 – continued from previous page

Sample	Classification	≥4jets MT2W≥ 200 $250 < MET < 350$	≥4jets MT2W≥ 200 $350 < MET < 450$	≥4jets MT2W≥ 200 $450 < MET < 550$	≥4jets MT2W≥ 200 $550 < MET < 650$	≥4jets MT2W≥ 200 $MET > 650$
single t, s-channel, amcnlo pythia8	Inclusve	-0.16 ± 0.16	—	—	—	—
	1 lepton	-0.16 ± 0.16	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	-0.16 ± 0.16	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
V+Jets	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	0.36 ± 0.12	0.53 ± 0.32	0.38 ± 0.25
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	-9.40 ± 9.40	-4.63 ± 4.63	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
DY+Jets→ $\ell\ell$	Inclusve	-9.40 ± 9.40	-4.63 ± 4.63	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	-9.40 ± 9.40	-4.63 ± 4.63	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
DY+Jets→ $\ell\ell$, M10to50, amcnlo pythia8	Inclusve	—	—	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
DY+Jets→ $\ell\ell$, M50, amcnlo pythia8	Inclusve	-9.40 ± 9.40	-4.63 ± 4.63	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	-9.40 ± 9.40	-4.63 ± 4.63	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$	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
	1 lepton, from W	3.53 ± 0.79	2.04 ± 0.76	0.36 ± 0.12	0.53 ± 0.32	0.38 ± 0.25
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$, $100 < HT < 200$, madgraph pythia8	Inclusve	—	—	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$, $200 < HT < 400$, madgraph pythia8	Inclusve	—	—	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$, $400 < HT < 600$, madgraph pythia8	Inclusve	0.67 ± 0.67	0.70 ± 0.70	—	—	—
	1 lepton	0.67 ± 0.67	0.70 ± 0.70	—	—	—
	1 lepton, from W	0.67 ± 0.67	0.70 ± 0.70	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$, $600 < HT < 800$, madgraph pythia8	Inclusve	0.86 ± 0.25	0.06 ± 0.06	—	—	—
	1 lepton	0.86 ± 0.25	0.06 ± 0.06	—	—	—
	1 lepton, from W	0.86 ± 0.25	0.06 ± 0.06	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—

Table 12 – continued from previous page

Sample	Classification	≥4jets MT2W≥ 200 250 < MET < 350	≥4jets MT2W≥ 200 350 < MET < 450	≥4jets MT2W≥ 200 450 < MET < 550	≥4jets MT2W≥ 200 550 < MET < 650	≥4jets MT2W≥ 200 MET > 650
W+Jets→ $\ell\nu$, 800 < HT < 1200, madgraph pythia8	Inclusve	1.41 ± 0.20	0.53 ± 0.11	0.22 ± 0.07	—	0.01 ± 0.01
	1 lepton	1.41 ± 0.20	0.53 ± 0.11	0.22 ± 0.07	—	0.01 ± 0.01
	1 lepton, from W	1.41 ± 0.20	0.53 ± 0.11	0.22 ± 0.07	—	0.01 ± 0.01
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$, 1200 < HT < 2500, madgraph pythia8	Inclusve	0.55 ± 0.25	0.74 ± 0.27	0.14 ± 0.10	0.52 ± 0.32	0.35 ± 0.25
	1 lepton	0.55 ± 0.25	0.74 ± 0.27	0.14 ± 0.10	0.52 ± 0.32	0.35 ± 0.25
	1 lepton, from W	0.55 ± 0.25	0.74 ± 0.27	0.14 ± 0.10	0.52 ± 0.32	0.35 ± 0.25
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
W+Jets→ $\ell\nu$, 2500 < HT < Inf, madgraph pythia8	Inclusve	0.05 ± 0.03	0.01 ± 0.00	0.00 ± 0.00	0.01 ± 0.01	0.02 ± 0.01
	1 lepton	0.05 ± 0.03	0.01 ± 0.00	0.00 ± 0.00	0.01 ± 0.01	0.02 ± 0.01
	1 lepton, from W	0.05 ± 0.03	0.01 ± 0.00	0.00 ± 0.00	0.01 ± 0.01	0.02 ± 0.01
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
Rare	Inclusve	7.89 ± 0.65	4.09 ± 0.59	0.89 ± 0.25	0.53 ± 0.17	0.65 ± 0.29
	1 lepton	0.19 ± 0.08	0.08 ± 0.03	0.08 ± 0.04	0.05 ± 0.04	—
	1 lepton, from W	0.15 ± 0.07	0.06 ± 0.03	0.04 ± 0.03	0.04 ± 0.04	—
	1 lepton, from t	0.04 ± 0.04	0.02 ± 0.01	0.04 ± 0.02	0.00 ± 0.00	—
	≥ 2 leptons	6.59 ± 0.65	3.67 ± 0.59	0.66 ± 0.24	0.44 ± 0.16	0.59 ± 0.28
	$Z \to \nu\nu$	1.11 ± 0.06	0.34 ± 0.02	0.15 ± 0.05	0.04 ± 0.01	0.06 ± 0.04
diBoson	Inclusve	1.96 ± 0.38	1.79 ± 0.52	0.45 ± 0.16	0.30 ± 0.14	0.53 ± 0.27
	1 lepton	0.10 ± 0.04	0.04 ± 0.02	0.03 ± 0.03	0.04 ± 0.04	—
	1 lepton, from W	0.10 ± 0.04	0.04 ± 0.02	0.03 ± 0.03	0.04 ± 0.04	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	1.82 ± 0.37	1.70 ± 0.52	0.35 ± 0.15	0.25 ± 0.13	0.48 ± 0.27
	$Z \to \nu\nu$	0.05 ± 0.06	0.05 ± 0.01	0.07 ± 0.05	0.01 ± 0.00	0.05 ± 0.04
WW	Inclusve	0.65 ± 0.27	1.24 ± 0.49	0.12 ± 0.12	0.17 ± 0.12	0.40 ± 0.26
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	0.65 ± 0.27	1.24 ± 0.49	0.12 ± 0.12	0.17 ± 0.12	0.40 ± 0.26
	$Z \to \nu\nu$	—	—	—	—	—
$WW \to 2\ell 2\nu$, powheg	Inclusve	0.65 ± 0.27	1.24 ± 0.49	0.12 ± 0.12	0.17 ± 0.12	0.40 ± 0.26
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	0.65 ± 0.27	1.24 ± 0.49	0.12 ± 0.12	0.17 ± 0.12	0.40 ± 0.26
	$Z \to \nu\nu$	—	—	—	—	—
$WW \to \ell\nu qq$, powheg	Inclusve	—	—	—	—	—
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
WZ	Inclusve	1.10 ± 0.27	0.45 ± 0.16	0.31 ± 0.10	0.11 ± 0.06	0.12 ± 0.06
	1 lepton	0.10 ± 0.04	0.04 ± 0.02	0.03 ± 0.03	0.04 ± 0.04	—
	1 lepton, from W	0.10 ± 0.04	0.04 ± 0.02	0.03 ± 0.03	0.04 ± 0.04	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	1.06 ± 0.26	0.40 ± 0.16	0.23 ± 0.08	0.07 ± 0.04	0.08 ± 0.05
	$Z \to \nu\nu$	-0.05 ± 0.05	—	0.05 ± 0.05	—	0.04 ± 0.04
$WZ \to 3\ell\nu$, powheg pythia8	Inclusve	0.86 ± 0.25	0.31 ± 0.15	0.20 ± 0.08	0.05 ± 0.03	0.08 ± 0.05
	1 lepton	—	—	—	—	—
	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	0.86 ± 0.25	0.31 ± 0.15	0.20 ± 0.08	0.05 ± 0.03	0.08 ± 0.05
	$Z \to \nu\nu$	—	—	—	—	—

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Table 12 – continued from previous page

Sample	Classification	≥4jets MT2W≥ 200 250 < MET < 350	≥4jets MT2W≥ 200 350 < MET < 450	≥4jets MT2W≥ 200 450 < MET < 550	≥4jets MT2W≥ 200 550 < MET < 650	≥4jets MT2W≥ 200 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	—	—	—	—	—
$WZ{\to}2\ell 2Q$, amcnlo pythia8	1 lepton, from W	—	—	—	—	—
	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
	$Z \to \nu\nu$	—	—	—	—	—
	Inclusve	0.10 ± 0.04	0.04 ± 0.02	0.03 ± 0.03	0.04 ± 0.04	—
	1 lepton	0.10 ± 0.04	0.04 ± 0.02	0.03 ± 0.03	0.04 ± 0.04	—
$WZ{\to}\ell\nu 2Q$, amcnlo pythia8	1 lepton, from W	0.10 ± 0.04	0.04 ± 0.02	0.03 ± 0.03	0.04 ± 0.04	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	—	—	—
	Inclusve	-0.05 ± 0.05	—	0.05 ± 0.05	—	0.04 ± 0.04
	1 lepton	—	—	—	—	—
$WZ{\to}1\ell 3\nu$, amcnlo pythia8	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	-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	—	—	—	—	—
ZZ	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	0.11 ± 0.03	0.05 ± 0.03	-0.00 ± 0.01	0.00 ± 0.00	
	$Z \to \nu\nu$	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	—	—	—	—	—
$ZZ{\to}2\ell 2Q$, amcnlo pythia8	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	0.11 ± 0.03	0.05 ± 0.03	-0.00 ± 0.01	0.00 ± 0.00	—
	$Z \to \nu\nu$	—	—	—	—	—
	Inclusve	0.11 ± 0.01	0.05 ± 0.01	0.02 ± 0.01	0.01 ± 0.00	0.01 ± 0.00
	1 lepton	—	—	—	—	—
$ZZ{\to}2\ell 2\nu$, powheg pythia8	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	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	—	—	—	—	—
$ZZ{\to}2Q2\nu$, amcnlo pythia8	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	—	—	—	—	—
	$Z \to \nu\nu$	—	—	0.01 ± 0.01	—	—
	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	—	—
	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
	$Z \to \nu\nu$	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	—	—
$t\bar{t} + W$	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
	$Z \to \nu\nu$	—	—	—	—	—
	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	—	—
$t\bar{t} + W{\to}\ell\nu$, amcnlo pythia8	1 lepton, from W	0.06 ± 0.06	0.02 ± 0.02	0.02 ± 0.02	—	—
	1 lepton, from t	—	—	—	—	—
	≥ 2 leptons	3.27 ± 0.49	1.45 ± 0.27	0.12 ± 0.17	0.10 ± 0.09	0.12 ± 0.07
	$Z \to \nu\nu$	—	—	—	—	—

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Table 12 – continued from previous page

Sample	Classification	≥4jets MT2W≥ 200 $250 < MET < 350$	≥4jets MT2W≥ 200 $350 < MET < 450$	≥4jets MT2W≥ 200 $450 < MET < 550$	≥4jets MT2W≥ 200 $550 < MET < 650$	≥4jets MT2W≥ 200 $MET > 650$
	Inclusve	0.34 ± 0.19	0.24 ± 0.09	0.14 ± 0.08	0.06 ± 0.04	-0.02 ± 0.06
	1 lepton	-0.01 ± 0.04	0.01 ± 0.01	0.03 ± 0.02	—	—
$t\bar{t} + W{\rightarrow}QQ$, amcnlo pythia8	1 lepton, from W	—	—	—	—	—
	1 lepton, from t	-0.01 ± 0.04	0.01 ± 0.01	0.03 ± 0.02	—	—
	≥ 2 leptons	0.35 ± 0.19	0.23 ± 0.09	0.11 ± 0.08	0.06 ± 0.04	-0.02 ± 0.06
	$Z \rightarrow \nu\nu$	—	—	—	—	—
	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	—
$t\bar{t} + Z$	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
	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	—
$t\bar{t} + Z$, madgraph	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
	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	—	—	—
$t\bar{t} + Z{\rightarrow}QQ$, amcnlo pythia8	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
	$Z \rightarrow \nu\nu$	—	—	—	—	—
	Inclusve	1.33 ± 0.43	0.74 ± 0.25	0.33 ± 0.12	0.06 ± 0.06	0.11 ± 0.04
	1 lepton	—	—	—	—	—
$t\bar{t} + Z{\rightarrow}2\ell2\nu$, amcnlo pythia8	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

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