Extract of Summary Tables and Plots

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W+jets MC numbers

$\nu\nu$ selection

Step	W$\to e\nu$	W$\to \mu\nu$	W$\to \tau\nu$	Z$\to \nu\nu$	Z$\to$ll	EWK Z+2j
$\Delta\phi < 1.0$	65 ± 9	64 ± 8	55 ± 7	126 ± 7	1.9 ± 0.5	0 ± 0
$\Delta\phi > 2.6$	62 ± 7	67 ± 8	49 ± 7	107 ± 4	1.6 ± 0.6	0 ± 0

$e\nu$ selection

Step	W$\to e\nu$	W$\to \mu\nu$	W$\to \tau\nu$	Z$\to \nu\nu$	Z$\to$ll	EWK Z+2j
$\Delta\phi < 1.0$	43 ± 6	0 ± 0	0.5 ± 0.5	0 ± 0	0.9 ± 0.3	0.4 ± 0.1
$\Delta\phi > 2.6$	18 ± 4	0.4 ± 0.4	0 ± 0	0 ± 0	0.4 ± 0.2	0.3 ± 0.1

$\mu\nu$ selection

Step	W$\to e\nu$	W$\to \mu\nu$	W$\to \tau\nu$	Z$\to \nu\nu$	Z$\to$ll	EWK Z+2j
$\Delta\phi < 1.0$	0 ± 0	164 ± 14	0 ± 0	0 ± 0	5.9 ± 0.9	1.9 ± 0.3
$\Delta\phi > 2.6$	0 ± 0	131 ± 11	0 ± 0	0 ± 0	4.9 ± 0.8	2.4 ± 0.4

Standard Selection - For Reference

Signal selection

Step	QCD	γ+jets	Top	W+jets	Z+jets	VV	SumMC	Data	Signal 120
HLTMetClean	13661242± 836429	13687± 51	44648± 168	221636± 597	52009± 181	2504 ± 14	13995726± 837440	2198348	2745 ± 32
LeptonVeto	6566160± 466165	5227 ± 22	0 ± 0	0 ± 0	21396± 78	0 ± 0	6592783± 466265	2140281	2067 ± 25
JetPair	1529141± 103399	3306 ± 18	0 ± 0	0 ± 0	9523 ± 39	0 ± 0	1541970± 103455	1435063	1440 ± 21
AN	23162± 2055	262 ± 6	834 ± 24	5271 ± 62	3334 ± 29	0 ± 0	32862± 2176	32324	856 ± 18
DEta	605071± 46654	755 ± 12	1046 ± 22	11465± 84	4892 ± 37	85 ± 2	623315± 46811	576792	1171 ± 19
MET	8540 ± 1778	95 ± 5	468 ± 17	4300 ± 55	2666 ± 28	49 ± 2	16118± 1884	16282	881 ± 17
TightMjj	6560 ± 1445	59 ± 4	235 ± 13	2057 ± 39	1269 ± 18	17 ± 1	10197± 1520	10481	543 ± 14
DPhiSIGNAL	0 ± 0	0.13 ± 0.10	2.2 ± 0.9	184 ± 14	128 ± 7	2.5 ± 0.4	317 ± 23	XXX	154 ± 7
DPhiQCD	3065 ± 917	7 ± 1	8 ± 2	178 ± 13	109 ± 5	0.8 ± 0.2	3367 ± 938	2784	30 ± 3

W/Z+jets sample separated

Step	W$\rightarrow e\nu$	W$\rightarrow \mu\nu$	W$\rightarrow \tau\nu$	Z$\rightarrow \nu\nu$	Z$\rightarrow$ll	EWK Z+2j
$\Delta\phi < 1.0$	65 ± 9	64 ± 8	55 ± 7	126 ± 7	1.9 ± 0.5	0 ± 0
$\Delta\phi > 2.6$	62 ± 7	67 ± 8	49 ± 7	107 ± 4	1.6 ± 0.6	0 ± 0

W+jets selection - Electron selection

Step	QCD	γ+jets	Top	W+jets	Z+jets	VV	SumMC	Data	Signal 120
HLTMetClean	13661242± 836429	13687± 51	44648± 168	221636± 597	52009± 181	2504 ± 14	13995726± 837440	2198348	2745 ± 32
WSelection	178 ± 99	42 ± 2	2528 ± 29	13434± 132	253 ± 8	136 ± 3	16571± 272	9146	0.5 ± 0.4
JetPair	16 ± 6	21 ± 1	1304 ± 22	3729 ± 41	97 ± 3	34 ± 1	5202 ± 75	5551	0 ± 0
AN	0.7 ± 0.6	0.8 ± 0.2	277 ± 14	952 ± 25	25 ± 2	9.4 ± 1.0	1265 ± 43	1091	0 ± 0
DEta	0.5 ± 0.4	3.9 ± 0.7	326 ± 12	1516 ± 29	32 ± 2	12.3 ± 0.9	1891 ± 45	2063	0 ± 0
MET	0 ± 0	0.12 ± 0.07	144 ± 9	611 ± 20	14 ± 2	5.6 ± 0.7	775 ± 32	719	0 ± 0
TightMjj	0 ± 0	0.10 ± 0.07	82 ± 7	316 ± 15	9 ± 1	1.9 ± 0.4	409 ± 24	398	0 ± 0
DPhiSIGNAL	0 ± 0	0 ± 0	3 ± 1	43 ± 6	1.3 ± 0.5	0.5 ± 0.2	48 ± 8	44	0 ± 0
DPhiQCD	0 ± 0	0 ± 0	0.7 ± 0.5	19 ± 4	0.7 ± 0.4	0.07 ± 0.07	20 ± 5	42	0 ± 0

W+jets selection - Muon selection

Step	QCD	γ+jets	Top	W+jets	Z+jets	VV	SumMC	Data	Signal 120
HLTMetClean	13661242± 836429	13687± 51	44648± 168	221636± 597	52009± 181	2504 ± 14	13995726± 837440	2198348	2745 ± 32
WSelection	7860 ± 6594	2.6 ± 0.5	5381 ± 45	26807± 135	2270 ± 17	289 ± 4	42610± 6795	24341	0 ± 0
JetPair	212 ± 92	0.6 ± 0.2	2725 ± 34	11030± 74	970 ± 10	88 ± 2	15025± 213	15433	0 ± 0
AN	0.1 ± 0.1	0.05 ± 0.05	316 ± 15	1218 ± 29	72 ± 4	9.1 ± 1.0	1616 ± 49	1395	0 ± 0
DEta	90 ± 65	0.03 ± 0.02	752 ± 20	4704 ± 55	389 ± 7	35 ± 2	5970 ± 148	6007	0 ± 0
MET	0 ± 0	0 ± 0	504 ± 17	2877 ± 46	172 ± 5	24 ± 1	3578 ± 70	3334	0 ± 0
TightMjj	0 ± 0	0 ± 0	238 ± 13	1332 ± 32	81 ± 4	8.1 ± 0.9	1659 ± 49	1645	0 ± 0
DPhiSIGNAL	0 ± 0	0 ± 0	7 ± 2	164 ± 14	8 ± 1	1.0 ± 0.3	180 ± 17	165	0 ± 0
DPhiQCD	0 ± 0	0 ± 0	6 ± 2	131 ± 11	7 ± 1	0.6 ± 0.2	145 ± 15	155	0 ± 0

Data-driven W+jets estimates - standard selection - signal region - central

From MC

Step	W$\to e\nu$	W$\to \mu\nu$	W$\to \tau\nu$	Z$\to \nu\nu$	Z$\to$ll	EWK Z+2j
$\Delta\phi < 1.0$	65 ± 9	64 ± 8	55 ± 7	126 ± 7	1.9 ± 0.5	0 ± 0
$\Delta\phi > 2.6$	62 ± 7	67 ± 8	49 ± 7	107 ± 4	1.6 ± 0.6	0 ± 0

From data: electron $\Delta\phi < 1.0$

	Signal sample	Control sample
N_{data}	XXX	44
N_{EWK}	n/a	4.8 ± 1.14
$N^{MC}_{W\to e\nu}$	$65 \pm 9\ ^{+18.6(+28.6\%)}_{-9.43(-14.5\%)}$	$43 \pm 6\ ^{+4.47(+10.4\%)}_{-7.62(-17.7\%)}$
$N^{data}_{W\to e\nu}$	$59.3 \pm 15.8\ ^{+11.6(+19.6\%)}_{-0.306(-0.516\%)}$	$39.2 \pm 7.09\ ^{+0.922(+2.35\%)}_{-0.2(-0.51\%)}$

From data: electron $\Delta\phi > 2.6$

	Signal sample	Control sample
N_{data}	XXX	42
N_{EWK}	n/a	1.47 ± 0.644
$N^{MC}_{W\to e\nu}$	$62 \pm 7\ ^{+5.1(+8.22\%)}_{-1.41(-2.28\%)}$	$18 \pm 4\ ^{+1.41(+7.86\%)}_{-2.24(-12.4\%)}$
$N^{data}_{W\to e\nu}$	$140 \pm 40.5\ ^{+13.9(+9.96\%)}_{-6.31(-4.52\%)}$	$40.5 \pm 6.03\ ^{+0(+0\%)}_{-0.685(-1.69\%)}$

From data: muon $\Delta\phi < 1.0$

	Signal sample	Control sample
N_{data}	XXX	165
N_{EWK}	n/a	16 ± 2.26
$N^{MC}_{W\to\mu\nu}$	$64 \pm 8\ ^{+15(+23.4\%)}_{-10(-15.6\%)}$	$164 \pm 14\ ^{+15.7(+9.54\%)}_{-20.2(-12.3\%)}$
$N^{data}_{W\to\mu\nu}$	$58.1 \pm 10.2\ ^{+7.52(+12.9\%)}_{-2.73(-4.7\%)}$	$149 \pm 13.2\ ^{+2.33(+1.56\%)}_{-0.608(-0.408\%)}$

From data: muon $\Delta\phi > 2.6$

	Signal sample	Control sample
N_{data}	XXX	155
N_{EWK}	n/a	13.6 ± 2.24
$N^{MC}_{W\to\mu\nu}$	$67 \pm 8\ ^{+5.83(+8.7\%)}_{-5(-7.46\%)}$	$131 \pm 11\ ^{+9.49(+7.24\%)}_{-12.4(-9.44\%)}$
$N^{data}_{W\to\mu\nu}$	$72.3 \pm 12.3\ ^{+4.07(+5.62\%)}_{-3.28(-4.53\%)}$	$141 \pm 12.2\ ^{+0.1(+0.0707\%)}_{-2.24(-1.58\%)}$

Data-driven W+jets estimates - standard selection - signal region - JESUP

From MC

Step	W$\to e\nu$	W$\to \mu\nu$	W$\to \tau\nu$	Z$\to \nu\nu$	Z$\to$ll	EWK Z+2j
$\Delta\phi < 1.0$	76 ± 9	76 ± 9	61 ± 8	145 ± 8	1.8 ± 0.5	0 ± 0
$\Delta\phi > 2.6$	67 ± 8	72 ± 8	57 ± 7	119 ± 4	1.9 ± 0.6	0 ± 0

From data: electron signal

	Signal sample	Control sample
N_{data}	XXX	44
N_{EWK}	n/a	5 ± 1.14
$N^{MC}_{W\to e\nu}$	76 ± 9	47 ± 6
$N^{data}_{W\to e\nu}$	63.1 ± 15.9	39 ± 7.09

From data: electron QCD

	Signal sample	Control sample
N_{data}	XXX	42
N_{EWK}	n/a	1.8 ± 0.726
$N^{MC}_{W\to e\nu}$	67 ± 8	19 ± 4
$N^{data}_{W\to e\nu}$	142 ± 40.4	40.2 ± 6.04

From data: muon signal

	Signal sample	Control sample
N_{data}	XXX	165
N_{EWK}	n/a	16.6 ± 2.29
$N^{MC}_{W\to \mu\nu}$	76 ± 9	178 ± 14
$N^{data}_{W\to \mu\nu}$	63.4 ± 10.6	148 ± 13.2

From data: muon QCD

	Signal sample	Control sample
N_{data}	XXX	155
N_{EWK}	n/a	15.6 ± 2.24
$N^{MC}_{W\to \mu\nu}$	72 ± 8	140 ± 12
$N^{data}_{W\to \mu\nu}$	71.7 ± 11.9	139 ± 12.2

Data-driven W+jets estimates - standard selection - signal region - JESDOWN

From MC

Step	W$\to e\nu$	W$\to \mu\nu$	W$\to \tau\nu$	Z$\to \nu\nu$	Z$\to$ll	EWK Z+2j
$\Delta\phi < 1.0$	57 ± 8	56 ± 7	46 ± 7	108 ± 6	1.7 ± 0.5	0 ± 0
$\Delta\phi > 2.6$	61 ± 7	64 ± 8	46 ± 6	99 ± 4	1.3 ± 0.6	0 ± 0

From data: electron signal

	Signal sample	Control sample
N_{data}	XXX	44
N_{EWK}	n/a	3.9 ± 1.1
$N^{MC}_{W\to e\nu}$	57 ± 8	36 ± 6
$N^{data}_{W\to e\nu}$	63.5 ± 17.8	40.1 ± 7.09

From data: electron QCD

	Signal sample	Control sample
N_{data}	XXX	42
N_{EWK}	n/a	1.47 ± 0.644
$N^{MC}_{W\to e\nu}$	61 ± 7	17 ± 4
$N^{data}_{W\to e\nu}$	145 ± 43.8	40.5 ± 6.03

From data: muon signal

	Signal sample	Control sample
N_{data}	XXX	165
N_{EWK}	n/a	13.9 ± 2.26
$N^{MC}_{W\to \mu\nu}$	56 ± 7	145 ± 12
$N^{data}_{W\to \mu\nu}$	58.4 ± 10.1	151 ± 13.2

From data: muon QCD

	Signal sample	Control sample
N_{data}	XXX	155
N_{EWK}	n/a	13.5 ± 2.24
$N^{MC}_{W\to \mu\nu}$	64 ± 8	119 ± 11
$N^{data}_{W\to \mu\nu}$	76.1 ± 13.5	142 ± 12.2

Data-driven W+jets estimates - standard selection - signal region - JERBETTER

From MC

Step	W$\to e\nu$	W$\to \mu\nu$	W$\to \tau\nu$	Z$\to \nu\nu$	Z$\to$ll	EWK Z+2j
$\Delta\phi < 1.0$	60 ± 8	58 ± 8	51 ± 7	120 ± 7	1.6 ± 0.5	0 ± 0
$\Delta\phi > 2.6$	61 ± 7	63 ± 8	49 ± 7	106 ± 4	1.3 ± 0.6	0 ± 0

From data: electron signal

	Signal sample	Control sample
N_{data}	XXX	44
N_{EWK}	n/a	4.7 ± 1.14
$N^{MC}_{W\to e\nu}$	60 ± 8	40 ± 6
$N^{data}_{W\to e\nu}$	59 ± 15.9	39.3 ± 7.09

From data: electron QCD

	Signal sample	Control sample
N_{data}	XXX	42
N_{EWK}	n/a	2.07 ± 0.897
$N^{MC}_{W\to e\nu}$	61 ± 7	16 ± 4
$N^{data}_{W\to e\nu}$	152 ± 47.8	39.9 ± 6.07

From data: muon signal

	Signal sample	Control sample
N_{data}	XXX	165
N_{EWK}	n/a	15 ± 2.26
$N^{MC}_{W\to \mu\nu}$	58 ± 8	157 ± 13
$N^{data}_{W\to \mu\nu}$	55.4 ± 10.2	150 ± 13.2

From data: muon QCD

	Signal sample	Control sample
N_{data}	XXX	155
N_{EWK}	n/a	14.6 ± 2.24
$N^{MC}_{W\to \mu\nu}$	63 ± 8	128 ± 11
$N^{data}_{W\to \mu\nu}$	69.1 ± 12.2	140 ± 12.2

Data-driven W+jets estimates - standard selection - signal region - JERWORSE

From MC

Step	W$\to e\nu$	W$\to \mu\nu$	W$\to \tau\nu$	Z$\to \nu\nu$	Z$\to$ll	EWK Z+2j
$\Delta\phi < 1.0$	80 ± 10	73 ± 9	57 ± 8	132 ± 7	1.7 ± 0.5	0 ± 0
$\Delta\phi > 2.6$	63 ± 7	70 ± 8	55 ± 7	111 ± 4	2 ± 0.6	0 ± 0

From data: electron signal

	Signal sample	Control sample
N_{data}	XXX	44
N_{EWK}	n/a	4.6 ± 1.1
$N^{MC}_{W\to e\nu}$	80 ± 10	45 ± 6
$N^{data}_{W\to e\nu}$	70 ± 18	39.4 ± 7.09

From data: electron QCD

	Signal sample	Control sample
N_{data}	XXX	42
N_{EWK}	n/a	1.8 ± 0.726
$N^{MC}_{W\to e\nu}$	63 ± 7	19 ± 4
$N^{data}_{W\to e\nu}$	133 ± 37.5	40.2 ± 6.04

From data: muon signal

	Signal sample	Control sample
N_{data}	XXX	165
N_{EWK}	n/a	16.1 ± 2.27
$N^{MC}_{W\to \mu\nu}$	73 ± 9	171 ± 14
$N^{data}_{W\to \mu\nu}$	63.6 ± 11	149 ± 13.2

From data: muon QCD

	Signal sample	Control sample
N_{data}	XXX	155
N_{EWK}	n/a	13.7 ± 2.24
$N^{MC}_{W\to \mu\nu}$	70 ± 8	134 ± 12
$N^{data}_{W\to \mu\nu}$	73.8 ± 12.5	141 ± 12.2

Control plots (1)

Control plots for W+jets estimates: loose Mjj selection

W$\rightarrow e\nu$

W$\rightarrow \mu\nu$

Control plots for W+jets estimates: tight Mjj selection

W$\rightarrow e\nu$

W$\rightarrow \mu\nu$