Table 1: Event type compositons of single muon selection in background MC samples $\,$

	$\alpha_T > 0.55$			
$\alpha_T \text{ range}$ HT (GeV)	275–325	$\alpha_T > 325-375$	375–475	475–575
Translation factor (τ_h)	1.1 ± 0.2	1.0 ± 0.3	1.1 ± 0.1	0.9 ± 0.1
Control Data (τ_h)	27.0 ± 5.2	6.0 ± 2.4	18.0 ± 4.2	14.0 ± 3.7
Predicted BG (τ_h)	31.0 ± 8.6	6.0 ± 3.2	20.1 ± 4.9	13.0 ± 3.7 13.0 ± 3.8
Translation factor (non- τ_h)	2.1 ± 0.2	$\frac{0.0 \pm 0.2}{1.7 \pm 0.2}$	$\frac{20.1 \pm 4.9}{1.9 \pm 0.1}$	$\frac{13.0 \pm 3.0}{1.9 \pm 0.1}$
Control Data (non- τ_h)	337.0 ± 18.4	1.7 ± 0.2 148.0 ± 12.2	1.9 ± 0.1 138.0 ± 11.7	31.0 ± 5.6
Predicted BG (non- τ_h)	694.8 ± 78.4	246.6 ± 41.1	262.9 ± 23.7	59.5 ± 11.2
Total Predicted BG	725.8 ± 78.9	252.6 ± 41.2	283.0 ± 24.2	$\frac{33.5 \pm 11.2}{72.5 \pm 11.8}$
Data Hadronic Yield	784.0 ± 28.0	320.0 ± 41.2 320.0 ± 17.9	239.0 ± 24.2 239.0 ± 15.5	46.0 ± 6.8
HT (GeV)	575–675	$\frac{520.0 \pm 17.9}{675-775}$	$\frac{239.0 \pm 15.5}{7755 - 875}$	$\frac{40.0 \pm 0.0}{875-\infty}$
Translation factor (τ_h)	0.6 ± 0.1	0.6 ± 0.2	0.6 ± 0.3	0.2 ± 0.1
Control Data (τ_h)	0.0 ± 0.1 0.0 ± 0.0	0.0 ± 0.2 0.0 ± 0.0	0.0 ± 0.3 0.0 ± 0.0	0.2 ± 0.1 0.0 ± 0.0
Predicted BG (τ_h)	0.0 ± 0.0 0.0 ± 0.0	0.0 ± 0.0 0.0 ± 0.0	0.0 ± 0.0 0.0 ± 0.0	0.0 ± 0.0 0.0 ± 0.0
$\frac{\text{Trencted BG }(\tau_h)}{\text{Translation factor (non-}\tau_h)}$	2.0 ± 0.0	$\frac{0.0 \pm 0.0}{1.7 \pm 0.3}$	$\frac{0.0 \pm 0.0}{2.1 \pm 0.6}$	$\frac{0.0 \pm 0.0}{1.9 \pm 0.6}$
Control Data (non- τ_h)	5.0 ± 0.2 5.0 ± 2.2	1.7 ± 0.3 1.0 ± 1.0	0.0 ± 0.0	0.0 ± 0.0
Predicted BG (non- τ_h)	10.2 ± 4.6	1.0 ± 1.0 1.7 ± 1.7	0.0 ± 0.0 0.0 ± 0.0	0.0 ± 0.0 0.0 ± 0.0
$\frac{\text{Total Predicted BG (non-}\eta_h)}{\text{Total Predicted BG}}$	10.2 ± 4.6 10.2 ± 4.6	$\frac{1.7 \pm 1.7}{1.7 \pm 1.7}$	0.0 ± 0.0 0.0 ± 0.0	$\frac{0.0 \pm 0.0}{0.0 \pm 0.0}$
Data Hadronic Yield	10.2 ± 4.0 20.0 ± 4.5	6.0 ± 2.4	2.0 ± 1.4	0.0 ± 0.0 0.0 ± 0.0
	20.0 ± 4.5			<u>0.0 ± 0.0</u>
α_T range	$0.53 < lpha_T \le 0.55$			
The state ()	575–675	675–775	7755–875	875–∞
Translation factor (τ_h)	0.2 ± 0.1	0.5 ± 0.3	0.3 ± 0.2	0.2 ± 0.2
Control Data (τ_h)	3.0 ± 1.7	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0
Control Data (τ_h)	0.7 ± 0.4	0.0 ± 0.0	0.0 ± 0.0	$\frac{0.0 \pm 0.0}{0.0 \pm 1.2}$
Predicted BG (τ_h)	2.8 ± 0.6	2.5 ± 0.8	1.8 ± 1.0	2.2 ± 1.3
Translation factor (non- τ_h)	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0
Predicted BG (non- τ_h)	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	$\frac{0.0 \pm 0.0}{0.0 \pm 0.0}$
Total Predicted BG	0.7 ± 0.4	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0
Data Hadronic Yield	5.0 ± 2.2	0.0 ± 0.0	0.0 ± 0.0	1.0 ± 1.0
α_T range	$0.52 < \alpha_T \le 0.53$			
HT (GeV)			7755–875	$875-\infty$
Translation factor (τ_h)	_	_	0.2 ± 0.2	0.0 ± 0.0
Control Data (τ_h)	_	_	0.0 ± 0.0	0.0 ± 0.0
Predicted BG (τ_h)	_	_	0.0 ± 0.0	0.0 ± 0.0
Translation factor (non- τ_h)	_	_	5.3 ± 3.1	2.8 ± 1.8
Control Data (non- τ_h)	_	_	0.0 ± 0.0	0.0 ± 0.0
Predicted BG (non- τ_h)	_	_	0.0 ± 0.0	0.0 ± 0.0
Total Predicted BG	_1	_	0.0 ± 0.0	0.0 ± 0.0
Data Hadronic Yield	_	_	0.0 ± 0.0	1.0 ± 1.0