

Table 1: Event type compositions of single muon selection in background MC samples

α_T range	$\alpha_T > 0.55$			
HT (GeV)	275–325	325–375	375–475	475–575
Translation factor (τ_h)	3.5 ± 0.4	4.3 ± 0.9	3.6 ± 0.2	2.8 ± 0.2
Control Data (τ_h)	39.0 ± 6.2	13.0 ± 3.6	26.0 ± 5.1	23.0 ± 4.8
Predicted BG (τ_h)	134.7 ± 27.0	56.3 ± 19.3	94.0 ± 19.0	64.9 ± 14.3
Translation factor (non- τ_h)	1.8 ± 0.1	1.6 ± 0.1	1.6 ± 0.0	1.6 ± 0.1
Control Data (non- τ_h)	1145.0 ± 33.8	516.0 ± 22.7	426.0 ± 20.6	135.0 ± 11.6
Predicted BG (non- τ_h)	2086.2 ± 125.0	828.8 ± 78.6	692.0 ± 36.8	222.2 ± 20.9
Total Predicted BG	2220.9 ± 127.8	885.1 ± 80.9	786.0 ± 41.4	287.1 ± 25.3
Data Hadronic Yield	2953.0 ± 54.3	1218.0 ± 34.9	813.0 ± 28.5	271.0 ± 16.5
HT (GeV)	575–675	675–775	7755–875	875– ∞
Translation factor (τ_h)	2.0 ± 0.2	2.0 ± 0.3	1.5 ± 0.4	1.4 ± 0.5
Control Data (τ_h)	10.0 ± 3.2	4.0 ± 2.0	2.0 ± 1.4	1.0 ± 1.0
Predicted BG (τ_h)	20.2 ± 6.8	8.1 ± 4.3	3.1 ± 2.3	1.4 ± 1.5
Translation factor (non- τ_h)	1.5 ± 0.1	1.7 ± 0.2	1.9 ± 0.3	1.9 ± 0.4
Control Data (non- τ_h)	43.0 ± 6.6	16.0 ± 4.0	8.0 ± 2.8	1.0 ± 1.0
Predicted BG (non- τ_h)	66.5 ± 11.0	26.9 ± 7.5	15.4 ± 5.9	1.9 ± 1.9
Total Predicted BG	86.8 ± 12.9	35.1 ± 8.6	18.5 ± 6.3	3.3 ± 2.4
Data Hadronic Yield	95.0 ± 9.7	33.0 ± 5.7	12.0 ± 3.5	4.0 ± 2.0
α_T range	$0.53 < \alpha_T \leq 0.55$			
HT (GeV)	575–675	675–775	7755–875	875– ∞
Translation factor (τ_h)	1.8 ± 0.2	1.9 ± 0.4	1.4 ± 0.4	1.6 ± 0.4
Control Data (τ_h)	10.0 ± 3.2	1.0 ± 1.0	2.0 ± 1.4	4.0 ± 2.0
Control Data (τ_h)	18.1 ± 6.1	1.9 ± 1.9	2.8 ± 2.1	6.4 ± 3.6
Predicted BG (τ_h)	1.6 ± 0.2	1.6 ± 0.2	1.7 ± 0.4	1.8 ± 0.5
Translation factor (non- τ_h)	17.0 ± 4.1	11.0 ± 3.3	3.0 ± 1.7	5.0 ± 2.2
Predicted BG (non- τ_h)	26.8 ± 7.3	17.2 ± 5.8	5.0 ± 3.2	8.9 ± 4.6
Total Predicted BG	44.8 ± 9.5	19.1 ± 6.1	7.8 ± 3.8	15.3 ± 5.8
Data Hadronic Yield	74.0 ± 8.6	31.0 ± 5.6	6.0 ± 2.4	12.0 ± 3.5
α_T range	$0.52 < \alpha_T \leq 0.53$			
HT (GeV)	7755–875			875– ∞
Translation factor (τ_h)	–	–	1.6 ± 0.4	1.3 ± 0.3
Control Data (τ_h)	–	–	3.0 ± 1.7	1.0 ± 1.0
Predicted BG (τ_h)	–	–	4.9 ± 3.1	1.3 ± 1.3
Translation factor (non- τ_h)	–	–	1.8 ± 0.4	2.1 ± 0.5
Control Data (non- τ_h)	–	–	1.0 ± 1.0	4.0 ± 2.0
Predicted BG (non- τ_h)	–	–	1.8 ± 1.9	8.4 ± 4.6
Total Predicted BG	$\bar{1}$	–	6.7 ± 3.6	9.6 ± 4.8
Data Hadronic Yield	–	–	13.0 ± 3.6	11.0 ± 3.3