

Compendium of Muon Collider Cross Sections

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Particle Masses (GeV)

μ^-	0.1134
μ^+	0.1134
ν_μ	0.0
$\bar{\nu}_\mu$	0.0
e^-	0.000549
e^+	0.000549
ν_e	0.0
$\bar{\nu}_e$	0.0
τ^-	1.7768
τ^+	1.7768
ν_τ	0.0
$\bar{\nu}_\tau$	0.0
u	0.00255
\bar{u}	0.00255
d	0.00504
\bar{d}	0.00504
s	0.105
\bar{s}	0.105
c	1.27
\bar{c}	1.27
b	4.89
\bar{b}	4.89
t	172.5
\bar{t}	172.5

γ	0.0
W^+	80.398
W^-	80.398
Z	91.1876
g	0.0
h	110.9
H	400.0
A	400.0
H^+	407.9
H^-	407.9

$\tilde{\mu}_L^-$	202.9
$\tilde{\mu}_R^-$	144.1
$\tilde{\mu}_L^+$	202.9
$\tilde{\mu}_R^+$	144.1
$\tilde{\nu}_\mu$	185.2
$\tilde{\bar{\nu}}_\mu$	185.2
\tilde{e}_L^-	202.9
\tilde{e}_R^-	144.1
\tilde{e}_L^+	202.9
\tilde{e}_R^+	144.1
$\tilde{\nu}_e$	185.2
$\tilde{\bar{\nu}}_e$	185.2
$\tilde{\tau}_L^-$	134.4
$\tilde{\tau}_R^-$	206.8
$\tilde{\tau}_L^+$	134.4
$\tilde{\tau}_R^+$	206.8
$\tilde{\nu}_\tau$	184.7
$\tilde{\bar{\nu}}_\tau$	184.7
\tilde{u}_L	561.1
\tilde{u}_R	549.3
$\tilde{\bar{u}}_L$	561.1
$\tilde{\bar{u}}_R$	549.3
\tilde{d}_L	568.4
\tilde{d}_R	545.2
$\tilde{\bar{d}}_L$	568.4
$\tilde{\bar{d}}_R$	545.2

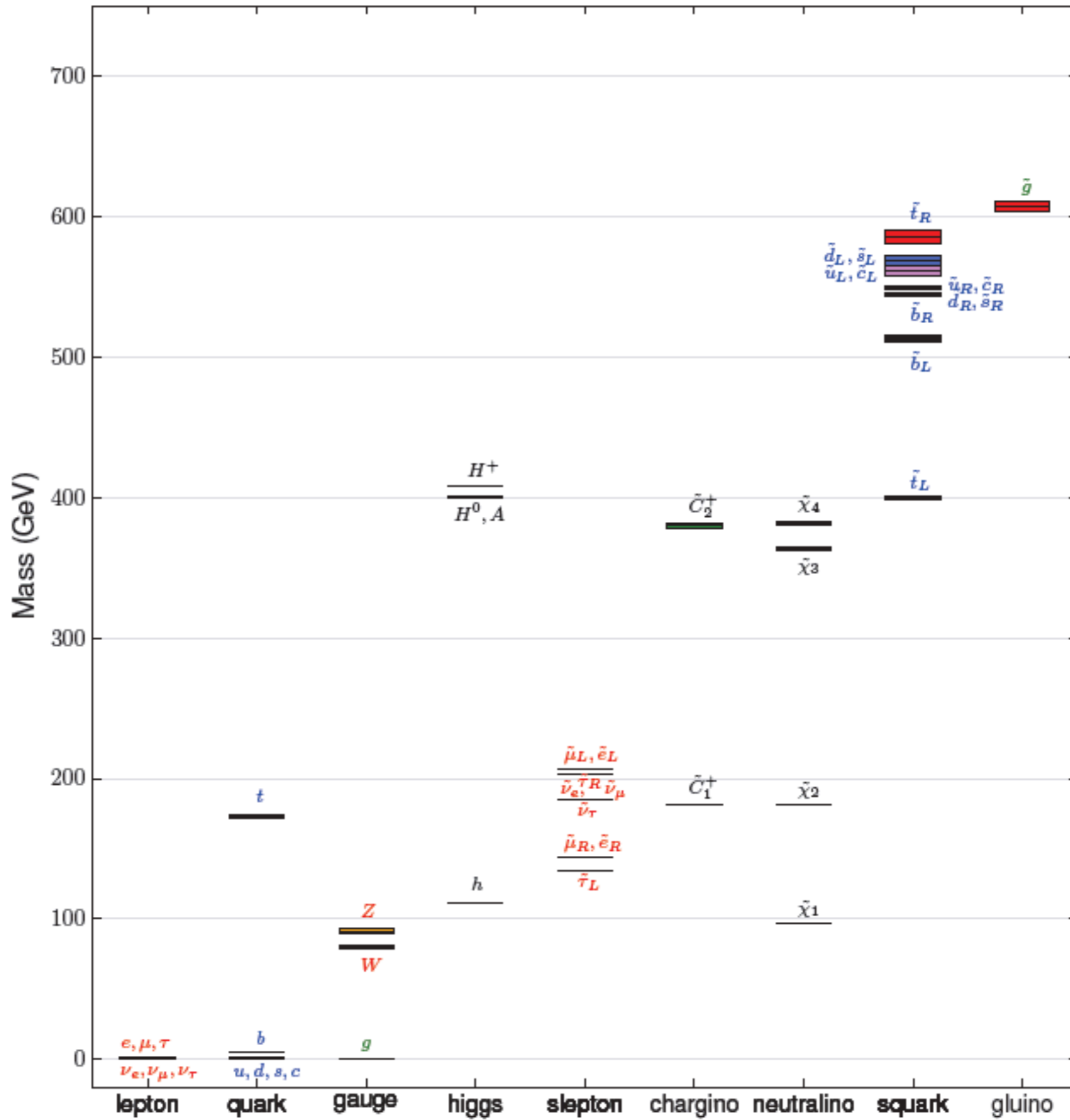
\tilde{s}_L	568.4
\tilde{s}_R	545.2
$\tilde{\bar{s}}_L$	568.4
$\tilde{\bar{s}}_R$	545.2
\tilde{c}_L	561.1
\tilde{c}_R	549.3
$\tilde{\bar{c}}_L$	561.1
$\tilde{\bar{c}}_R$	549.3
\tilde{b}_L	513.1
\tilde{b}_R	543.7
$\tilde{\bar{b}}_L$	513.1
$\tilde{\bar{b}}_R$	543.7
\tilde{t}_L	399.7
\tilde{t}_R	585.8
$\tilde{\bar{t}}_L$	399.7
$\tilde{\bar{t}}_R$	585.8

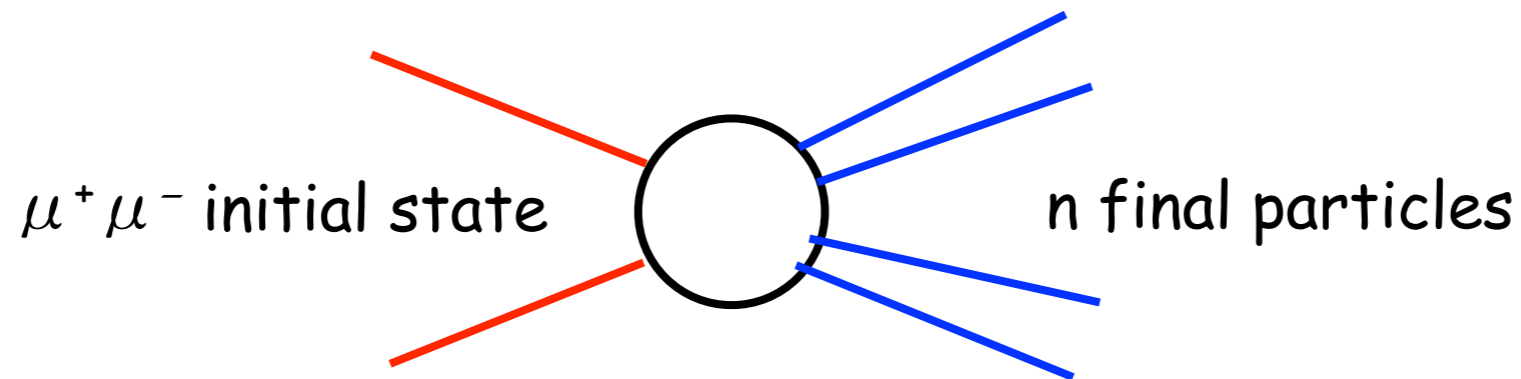
\tilde{g}	607.7
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\tilde{C}_1^+	181.7
\tilde{C}_1^-	181.7
\tilde{C}_2^+	379.9
\tilde{C}_2^-	379.9
\tilde{N}_1	96.69
\tilde{N}_2	181.1
\tilde{N}_3	363.8
\tilde{N}_4	381.7

SM m(higgs) = 120
 +2HDM
 +MSSM

MSSM Spectrum Plot





SM Processes

Ecm (TeV)	n				
	two	three	four	five	six
0.5	20	71	292	944	3059
0.6	20	71	296	956	3174
0.7	20	71	297	965	3211
0.8	20	71	297	966	3222
0.9	20	71	297	967	3227
1.0	20	71	297	967	3228
1.2	20	71	297	967	3229
1.5	20	71	297	967	3229
2.0	20	71	297	967	3229
3.0	20	71	297	967	3229
4.0	20	71	297	967	3229
5.0	20	71	297	967	3229
6.0	20	71	297	967	3229

MSSM Processes

Ecm (TeV)	n				
	two	three	four	five	six
0.5	47	238	1298	5162	19871
0.6	53	320	1657	7570	29325
0.7	53	372	2210	10268	45109
0.8	58	458	3305	16166	75092
0.9	62	504	3838	21248	100871
1.0	64	592	4496	26080	130475
1.2	85	710	6040	38158	214403
1.5	86	782	7497	53389	342690
2.0	86	830	8671	73288	551619
3.0	86	830	9128	82216	703549
4.0	86	830	9128	82216	712064
5.0	86	830	9128	82216	712064
6.0	86	830	9128	82216	712064

Calculating cross sections:

MadGraph/MadEvent - Tree graphs only

Couplings $h \rightarrow \mu^+ \mu^- = 0$

SM jets: $u, \bar{u}, d, \bar{d}, s, \bar{s}, c, \bar{c}, \text{gluon}$

Angular cone cut: ± 10 degrees applied
to jets, b , photons, charged leptons

Minimum pt cuts:

20 GeV - jets

10 GeV - photons, charged leptons

Resonance production with initial and final state radiation effects:

[S. Dittmaier and A. Kaiser \[arXiv:hep-ph/0203120\]](#)

Double counting: e.g. cross section with Z in (n) particle final state
is also counted with $Z \rightarrow f \bar{f}$ in $(n+1)$ particle final state

Total cross sections:

SM ($n>3$) $E_{cm} = 1.5 \text{ TeV}$: $3802 \pm 17 \text{ fb}$

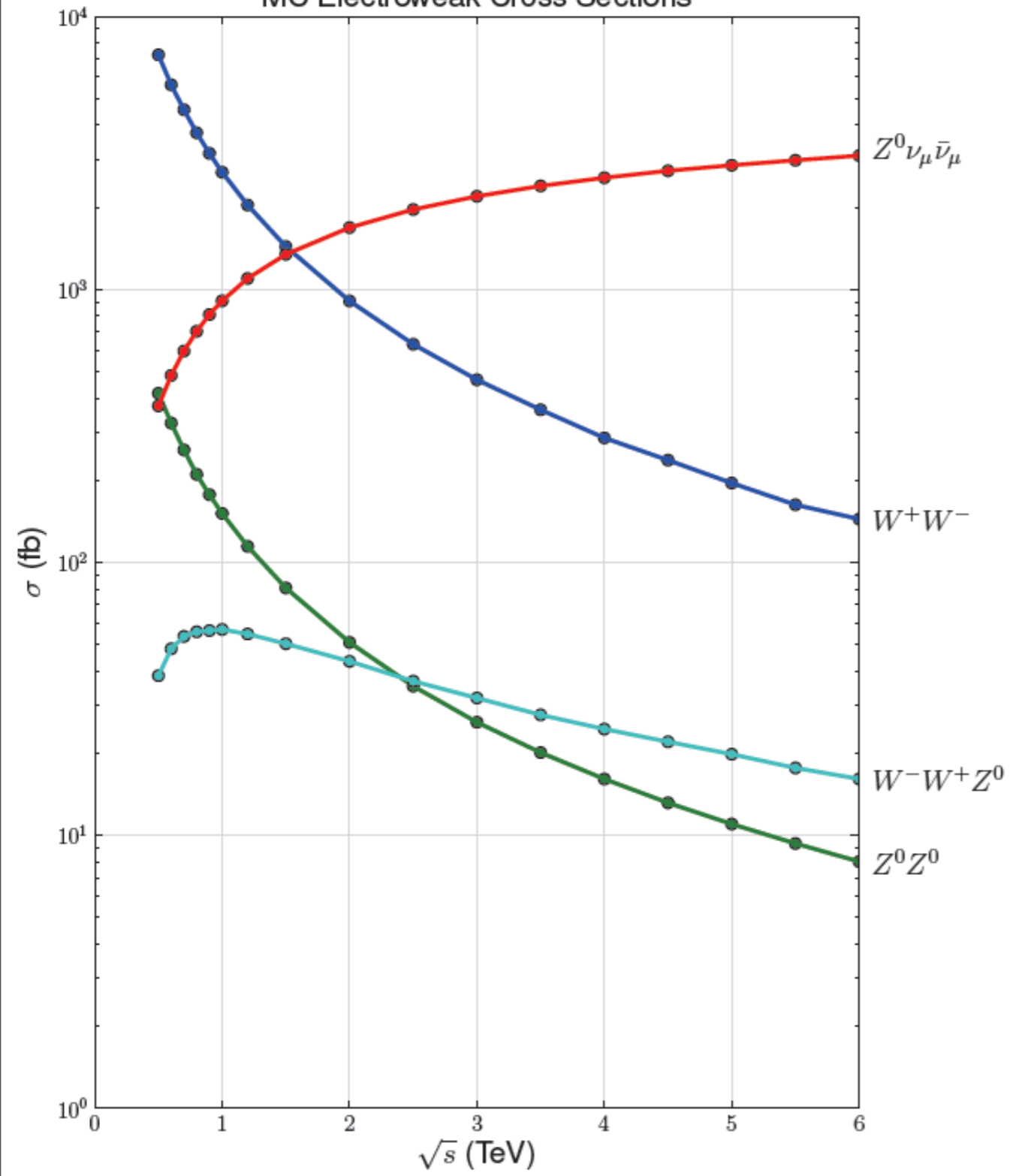
SM ($n>3$) $E_{cm} = 3.0 \text{ TeV}$: $3434 \pm 18 \text{ fb}$

MSSM ($n>2$) $E_{cm} = 3.0 \text{ TeV}$: $1476 \pm 5 \text{ fb}$ (with susy in final state)

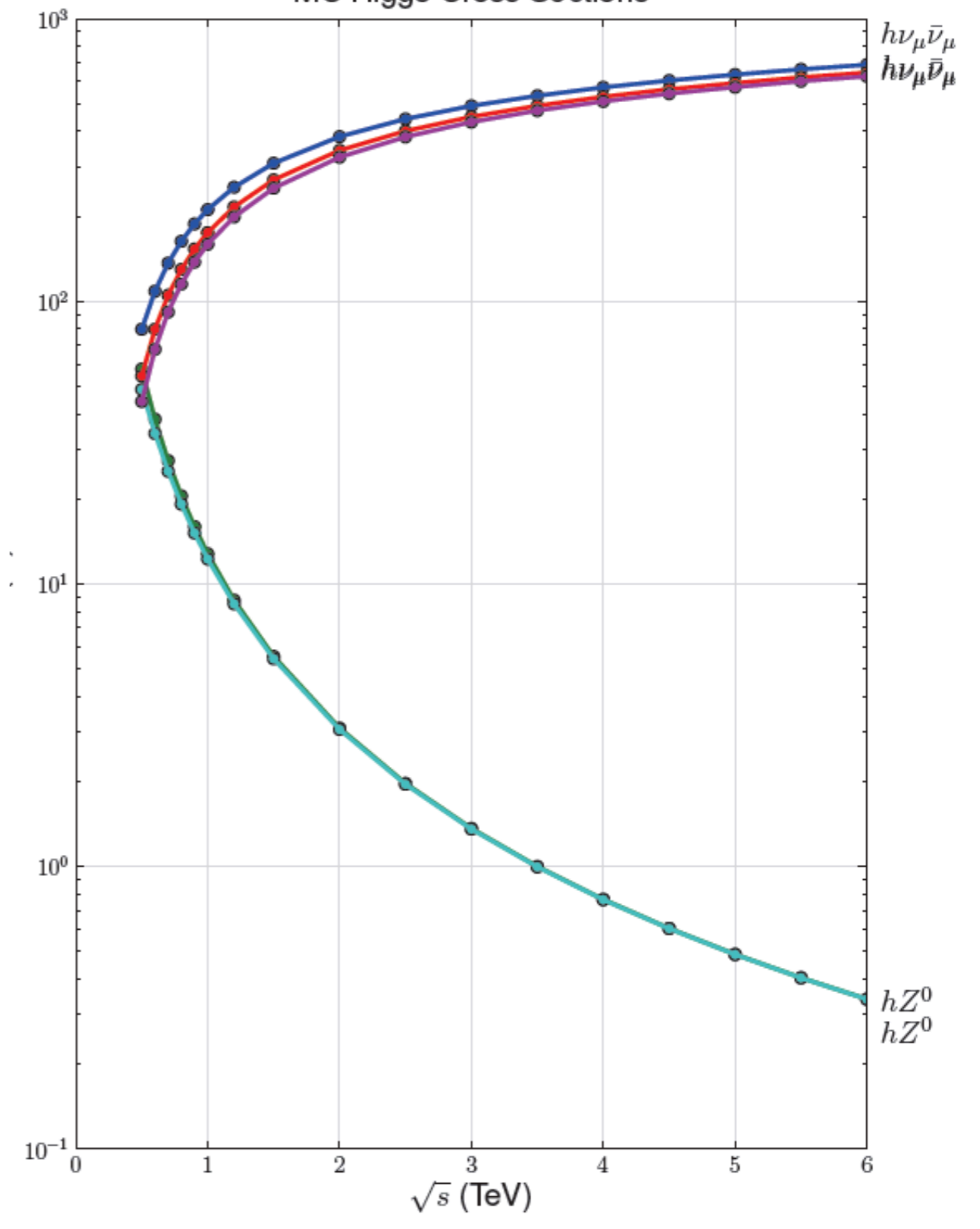
Can extract single particle inclusive rates:

(coming soon)

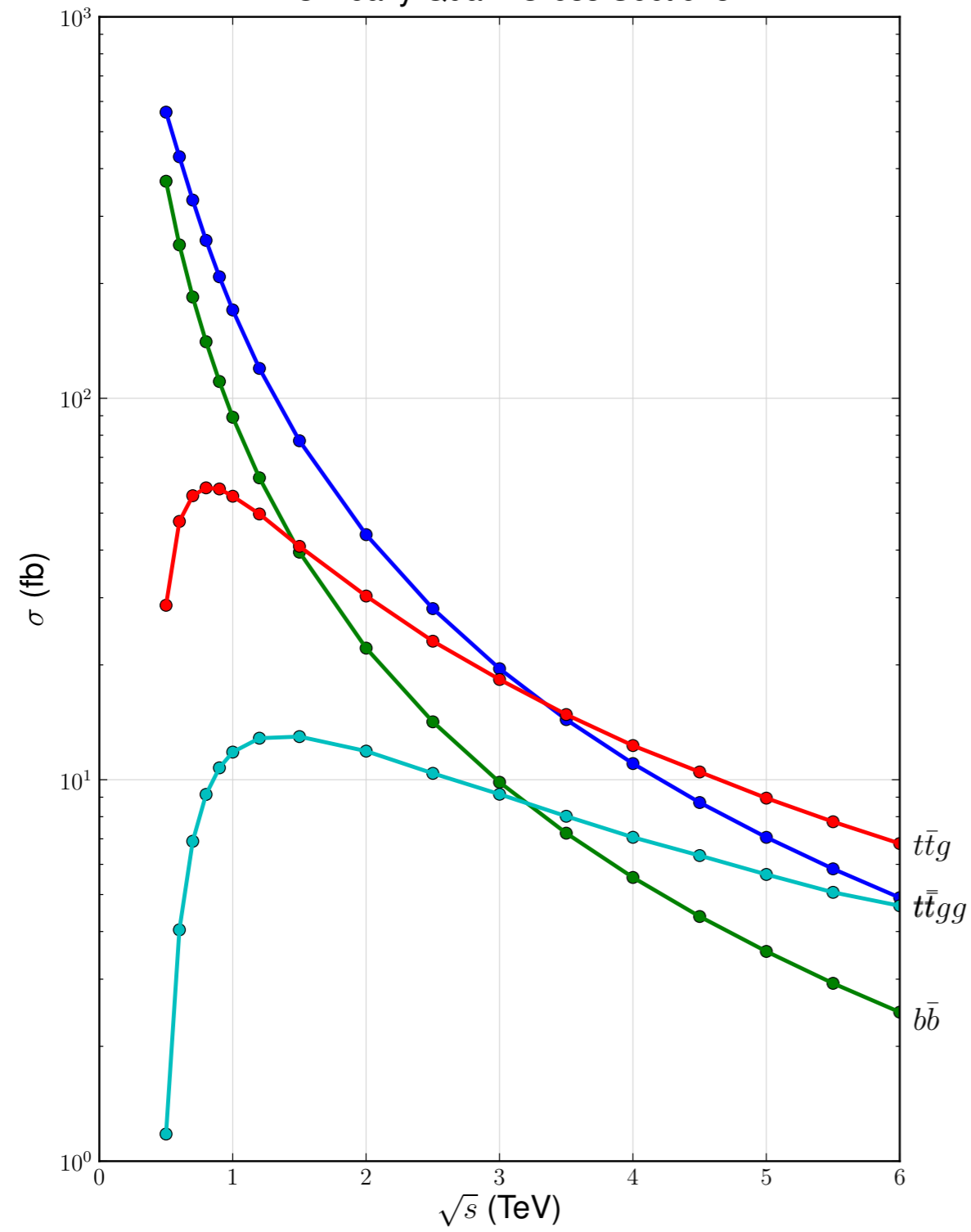
MC Electroweak Cross Sections



MC Higgs Cross Sections



MC Heavy Quark Cross Sections



Standard Model Processes

$$\sqrt{s} = 1.5 \text{ TeV}$$

Table 2: Lowest order cross sections for two particle final states at $\sqrt{s} = 1.5 \text{ TeV}$. Cone angle 10 degrees. All cross sections in femtobarns.

$\nu_\mu + \bar{\nu}_\mu$	$(5.282 \pm 0.014) \times 10^4$
$\mu^- + \mu^+$	$(1.681 \pm 0.002) \times 10^4$
$W^+ + W^-$	$(1.408 \pm 0.004) \times 10^3$
$\gamma + \gamma$	$(2.542 \pm 0.008) \times 10^2$
$\gamma + Z$	$(1.805 \pm 0.009) \times 10^2$
$t + \bar{t}$	$(7.757 \pm 0.032) \times 10^1$
$Z + Z$	$(7.754 \pm 0.018) \times 10^1$
$u + \bar{u}$	$(7.696 \pm 0.018) \times 10^1$
$c + \bar{c}$	$(7.696 \pm 0.018) \times 10^1$
$\tau^- + \tau^+$	$(4.815 \pm 0.020) \times 10^1$
$e^- + e^+$	$(4.812 \pm 0.011) \times 10^1$
$b + \bar{b}$	$(3.952 \pm 0.021) \times 10^1$
$s + \bar{s}$	$(3.941 \pm 0.013) \times 10^1$
$d + \bar{d}$	$(3.941 \pm 0.013) \times 10^1$
$\nu_\tau + \bar{\nu}_\tau$	$(1.092 \pm 0.002) \times 10^1$
$\nu_e + \bar{\nu}_e$	$(1.092 \pm 0.002) \times 10^1$
$h + Z$	(5.541 ± 0.023)
$h + h$	0
$h + \gamma$	0
$g + g$	0

Table 3: Lowest order cross sections for three particle final states at $\sqrt{s} = 1.5$ TeV. Cone angle 10 degrees. All cross sections in femtobarns.

$\nu_\mu + \bar{\nu}_\mu + \gamma$	$(2.657 \pm 0.010) \times 10^3$	$\nu_\tau + \bar{\nu}_\tau + Z$	$(1.142 \pm 0.004) \times 10^1$
$\nu_\mu + \bar{\nu}_\mu + Z$	$(1.284 \pm 0.004) \times 10^3$	$\nu_e + \bar{\nu}_e + Z$	$(1.142 \pm 0.004) \times 10^1$
$\mu^+ + \nu_\mu + W^-$	$(6.913 \pm 0.024) \times 10^2$	$t + \bar{t} + \gamma$	$(1.108 \pm 0.002) \times 10^1$
$\mu^- + \bar{\nu}_\mu + W^+$	$(6.893 \pm 0.023) \times 10^2$	$u + \bar{u} + Z$	(8.535 ± 0.044)
$\mu^- + \mu^+ + \gamma$	$(5.459 \pm 0.004) \times 10^2$	$c + \bar{c} + Z$	(8.535 ± 0.044)
$\nu_\mu + \bar{\nu}_\mu + h$	$(3.086 \pm 0.009) \times 10^2$	$s + \bar{s} + Z$	(7.574 ± 0.034)
$\bar{s} + c + W^-$	$(1.071 \pm 0.003) \times 10^2$	$d + \bar{d} + Z$	(7.574 ± 0.034)
$s + \bar{c} + W^+$	$(1.058 \pm 0.003) \times 10^2$	$\gamma + Z + Z$	(6.565 ± 0.037)
$u + \bar{d} + W^-$	$(1.058 \pm 0.004) \times 10^2$	$t + \bar{t} + Z$	(3.518 ± 0.014)
$\bar{u} + d + W^+$	$(1.055 \pm 0.005) \times 10^2$	$\tau^- + \tau^+ + Z$	(3.391 ± 0.012)
$\bar{b} + t + W^-$	$(8.724 \pm 0.088) \times 10^1$	$e^- + e^+ + Z$	(3.28 ± 0.013)
$b + \bar{t} + W^+$	$(8.604 \pm 0.109) \times 10^1$	$\mu^- + \mu^+ + h$	(3.203 ± 0.019)
$b + \bar{b} + g$	$(7.362 \pm 0.038) \times 10^1$	$h + W^+ + W^-$	(2.523 ± 0.011)
$\tau^- + \bar{\nu}_\tau + W^+$	$(6.68 \pm 0.026) \times 10^1$	$t + \bar{t} + h$	(1.28 ± 0.002)
$\tau^+ + \nu_\tau + W^-$	$(6.679 \pm 0.041) \times 10^1$	$b + \bar{b} + h$	$(8.32 \pm 0.047) \times 10^{-1}$
$e^- + \bar{\nu}_e + W^+$	$(6.671 \pm 0.053) \times 10^1$	$h + \gamma + Z$	$(6.551 \pm 0.058) \times 10^{-1}$
$e^+ + \nu_e + W^-$	$(6.664 \pm 0.025) \times 10^1$	$Z + Z + Z$	$(6.41 \pm 0.064) \times 10^{-1}$
$\gamma + W^+ + W^-$	$(6.465 \pm 0.020) \times 10^1$	$\nu_\tau + \bar{\nu}_\tau + h$	$(3.772 \pm 0.011) \times 10^{-1}$
$u + \bar{u} + g$	$(5.616 \pm 0.021) \times 10^1$	$\nu_e + \bar{\nu}_e + h$	$(3.772 \pm 0.011) \times 10^{-1}$
$c + \bar{c} + g$	$(5.616 \pm 0.021) \times 10^1$	$h + Z + Z$	$(1.975 \pm 0.010) \times 10^{-1}$
$\mu^- + \mu^+ + Z$	$(5.307 \pm 0.023) \times 10^1$	$s + \bar{s} + h$	$(1.524 \pm 0.006) \times 10^{-1}$
$W^+ + W^- + Z$	$(5.073 \pm 0.021) \times 10^1$	$d + \bar{d} + h$	$(1.524 \pm 0.006) \times 10^{-1}$
$t + \bar{t} + g$	$(4.071 \pm 0.023) \times 10^1$	$u + \bar{u} + h$	$(1.179 \pm 0.004) \times 10^{-1}$
$b + \bar{b} + \gamma$	$(2.895 \pm 0.019) \times 10^1$	$c + \bar{c} + h$	$(1.179 \pm 0.004) \times 10^{-1}$
$s + \bar{s} + g$	$(2.863 \pm 0.011) \times 10^1$	$h + h + Z$	$(7.727 \pm 0.086) \times 10^{-2}$
$d + \bar{d} + g$	$(2.863 \pm 0.011) \times 10^1$	$e^- + e^+ + h$	$(3.55 \pm 0.011) \times 10^{-2}$
$u + \bar{u} + \gamma$	$(2.52 \pm 0.010) \times 10^1$	$\tau^- + \tau^+ + h$	$(3.521 \pm 0.016) \times 10^{-2}$
$c + \bar{c} + \gamma$	$(2.52 \pm 0.010) \times 10^1$	$h + h + h$	0
$s + \bar{s} + \gamma$	$(1.967 \pm 0.009) \times 10^1$	$h + h + \gamma$	0
$d + \bar{d} + \gamma$	$(1.967 \pm 0.009) \times 10^1$	$h + g + g$	0
$\gamma + \gamma + \gamma$	$(1.824 \pm 0.007) \times 10^1$	$h + \gamma + \gamma$	0
$\gamma + \gamma + Z$	$(1.672 \pm 0.009) \times 10^1$	$g + g + g$	0
$b + \bar{b} + Z$	$(1.478 \pm 0.009) \times 10^1$	$\gamma + g + g$	0
$\nu_\tau + \bar{\nu}_\tau + \gamma$	$(1.338 \pm 0.003) \times 10^1$	$Z + g + g$	0
$\nu_e + \bar{\nu}_e + \gamma$	$(1.338 \pm 0.003) \times 10^1$		
$e^- + e^+ + \gamma$	$(1.187 \pm 0.002) \times 10^1$		
$\tau^- + \tau^+ + \gamma$	$(1.186 \pm 0.003) \times 10^1$		

Table 4: Lowest order cross sections for four particle final states at $\sqrt{s} = 1.5$ TeV. Cone angle 10 degrees. All cross sections in femtobarns.

$\nu_\mu + \bar{\nu}_\mu + b + \bar{b}$	$(3.767 \pm 0.013) \times 10^2$	$\bar{s} + c + b + \bar{t}$	$(1.761 \pm 0.010) \times 10^1$
$\mu^- + \mu^+ + \nu_\mu + \bar{\nu}_\mu$	$(1.778 \pm 0.003) \times 10^2$	$\bar{u} + d + \bar{b} + t$	$(1.745 \pm 0.010) \times 10^1$
$\mu^- + \bar{\nu}_\mu + \bar{s} + c$	$(1.532 \pm 0.004) \times 10^2$	$u + \bar{d} + b + \bar{t}$	$(1.729 \pm 0.016) \times 10^1$
$\mu^- + \bar{\nu}_\mu + u + \bar{d}$	$(1.53 \pm 0.004) \times 10^2$	$\nu_\mu + \bar{\nu}_\mu + Z + Z$	$(1.657 \pm 0.008) \times 10^1$
$\mu^+ + \nu_\mu + \bar{u} + d$	$(1.529 \pm 0.004) \times 10^2$	$\mu^+ + \nu_\mu + W^- + Z$	$(1.47 \pm 0.003) \times 10^1$
$\mu^+ + \nu_\mu + s + \bar{c}$	$(1.529 \pm 0.004) \times 10^2$	$\mu^- + \bar{\nu}_\mu + W^+ + Z$	$(1.466 \pm 0.003) \times 10^1$
$\nu_\mu + \bar{\nu}_\mu + s + \bar{s}$	$(1.433 \pm 0.005) \times 10^2$	$t + \bar{t} + g + g$	$(1.295 \pm 0.004) \times 10^1$
$\nu_\mu + \bar{\nu}_\mu + d + \bar{d}$	$(1.433 \pm 0.005) \times 10^2$	$\nu_\mu + \bar{\nu}_\mu + h + \gamma$	$(1.273 \pm 0.005) \times 10^1$
$\nu_\mu + \bar{\nu}_\mu + u + \bar{u}$	$(1.122 \pm 0.003) \times 10^2$	$\mu^- + \mu^+ + \gamma + \gamma$	$(1.233 \pm 0.006) \times 10^1$
$\nu_\mu + \bar{\nu}_\mu + c + \bar{c}$	$(1.122 \pm 0.003) \times 10^2$	$s + \bar{s} + g + g$	$(1.207 \pm 0.003) \times 10^1$
$b + \bar{b} + W^+ + W^-$	$(1.051 \pm 0.013) \times 10^2$	$d + \bar{d} + g + g$	$(1.207 \pm 0.003) \times 10^1$
$\nu_\mu + \bar{\nu}_\mu + \nu_\tau + \bar{\nu}_\tau$	$(8.806 \pm 0.036) \times 10^1$	$\bar{b} + t + \gamma + W^-$	$(1.203 \pm 0.006) \times 10^1$
$\nu_\mu + \bar{\nu}_\mu + \nu_e + \bar{\nu}_e$	$(8.803 \pm 0.036) \times 10^1$	$b + \bar{t} + \gamma + W^+$	$(1.197 \pm 0.007) \times 10^1$
$\nu_\mu + \nu_\mu + \bar{\nu}_\mu + \bar{\nu}_\mu$	$(8.665 \pm 0.024) \times 10^1$	$e^- + \bar{\nu}_e + \bar{s} + c$	$(1.186 \pm 0.005) \times 10^1$
$\bar{b} + t + W^- + g$	$(7.0 \pm 0.126) \times 10^1$	$\tau^- + \bar{\nu}_\tau + \bar{s} + c$	$(1.181 \pm 0.003) \times 10^1$
$\mu^- + \bar{\nu}_\mu + e^+ + \nu_e$	$(6.962 \pm 0.019) \times 10^1$	$e^- + \bar{\nu}_e + u + \bar{d}$	$(1.181 \pm 0.003) \times 10^1$
$\mu^+ + \nu_\mu + e^- + \bar{\nu}_e$	$(6.955 \pm 0.019) \times 10^1$	$\bar{s} + c + \gamma + W^-$	$(1.18 \pm 0.003) \times 10^1$
$\mu^+ + \nu_\mu + \tau^- + \bar{\nu}_\tau$	$(6.955 \pm 0.024) \times 10^1$	$u + \bar{d} + \gamma + W^-$	$(1.179 \pm 0.003) \times 10^1$
$\mu^- + \bar{\nu}_\mu + \tau^+ + \nu_\tau$	$(6.921 \pm 0.026) \times 10^1$	$e^+ + \nu_e + \bar{u} + d$	$(1.179 \pm 0.005) \times 10^1$
$b + \bar{t} + W^+ + g$	$(6.772 \pm 0.053) \times 10^1$	$\tau^- + \bar{\nu}_\tau + u + \bar{d}$	$(1.178 \pm 0.005) \times 10^1$
$\nu_\mu + \bar{\nu}_\mu + \gamma + Z$	$(6.667 \pm 0.014) \times 10^1$	$\tau^+ + \nu_\tau + s + \bar{c}$	$(1.177 \pm 0.003) \times 10^1$
$\nu_\mu + \bar{\nu}_\mu + \gamma + \gamma$	$(6.161 \pm 0.014) \times 10^1$	$\tau^+ + \nu_\tau + \bar{u} + d$	$(1.176 \pm 0.007) \times 10^1$
$b + \bar{b} + g + g$	$(5.345 \pm 0.078) \times 10^1$	$\bar{u} + d + \gamma + W^+$	$(1.167 \pm 0.004) \times 10^1$
$\nu_\mu + \bar{\nu}_\mu + \tau^- + \tau^+$	$(5.21 \pm 0.018) \times 10^1$	$s + \bar{c} + \gamma + W^+$	$(1.166 \pm 0.004) \times 10^1$
$\nu_\mu + \bar{\nu}_\mu + W^+ + W^-$	$(4.365 \pm 0.015) \times 10^1$	$e^+ + \nu_e + s + \bar{c}$	$(1.164 \pm 0.008) \times 10^1$
$\nu_\mu + \bar{\nu}_\mu + e^- + e^+$	$(4.094 \pm 0.012) \times 10^1$	$b + \bar{b} + Z + g$	$(1.141 \pm 0.010) \times 10^1$
$\mu^- + \bar{\nu}_\mu + \gamma + W^+$	$(3.526 \pm 0.005) \times 10^1$	$\bar{u} + d + W^+ + g$	$(1.039 \pm 0.011) \times 10^1$
$\mu^+ + \nu_\mu + \gamma + W^-$	$(3.506 \pm 0.006) \times 10^1$	$u + \bar{d} + W^- + g$	$(1.024 \pm 0.009) \times 10^1$
$u + \bar{u} + d + \bar{d}$	$(2.521 \pm 0.018) \times 10^1$	$s + \bar{c} + W^+ + g$	$(1.018 \pm 0.012) \times 10^1$
$s + \bar{s} + c + \bar{c}$	$(2.517 \pm 0.018) \times 10^1$	$\bar{s} + c + W^- + g$	(9.828 ± 0.119)
$\bar{u} + d + \bar{s} + c$	$(2.412 \pm 0.019) \times 10^1$	$\mu^- + \bar{\nu}_\mu + \bar{b} + t$	(9.578 ± 0.150)
$u + \bar{d} + s + \bar{c}$	$(2.41 \pm 0.011) \times 10^1$	$\mu^+ + \nu_\mu + b + \bar{t}$	(9.482 ± 0.081)
$u + \bar{u} + g + g$	$(2.369 \pm 0.007) \times 10^1$	$\tau^- + \bar{\nu}_\tau + \bar{b} + t$	(8.934 ± 0.127)
$c + \bar{c} + g + g$	$(2.369 \pm 0.007) \times 10^1$	$e^+ + \nu_e + b + \bar{t}$	(8.916 ± 0.092)
$\mu^- + \mu^+ + W^+ + W^-$	$(2.327 \pm 0.006) \times 10^1$	$e^- + \bar{\nu}_e + \bar{b} + t$	(8.907 ± 0.082)
$b + \bar{b} + \gamma + g$	$(2.093 \pm 0.035) \times 10^1$	$\tau^+ + \nu_\tau + b + \bar{t}$	(8.794 ± 0.151)
$s + \bar{c} + \bar{b} + t$	$(1.775 \pm 0.011) \times 10^1$	$u + \bar{u} + \gamma + g$	(8.595 ± 0.059)
		$c + \bar{c} + \gamma + g$	(8.595 ± 0.059)
		$\bar{s} + c + W^- + Z$	(8.472 ± 0.047)
		$u + \bar{d} + W^- + Z$	(8.456 ± 0.036)
		$\bar{u} + d + W^+ + Z$	(8.44 ± 0.033)

$s + \bar{c} + W^+ + Z$	(8.392 ± 0.032)	$c + \bar{c} + Z + g$	(2.202 ± 0.013)	$c + c + \bar{c} + \bar{c}$	$(7.861 \pm 0.026) \times 10^{-1}$
$\mu^- + \mu^+ + b + \bar{b}$	(8.299 ± 0.025)	$u + \bar{u} + \gamma + \gamma$	(2.184 ± 0.007)	$t + \bar{t} + \gamma + \gamma$	$(6.865 \pm 0.012) \times 10^{-1}$
$\tau^- + \tau^+ + \nu_\tau + \bar{\nu}_\tau$	(7.07 ± 0.058)	$c + \bar{c} + \gamma + \gamma$	(2.184 ± 0.007)	$\gamma + \gamma + \gamma + Z$	$(6.758 \pm 0.027) \times 10^{-1}$
$e^- + e^+ + \nu_e + \bar{\nu}_e$	(6.996 ± 0.044)	$b + b + \bar{b} + \bar{b}$	(2.146 ± 0.012)	$\nu_\tau + \bar{\nu}_\tau + u + \bar{u}$	$(6.545 \pm 0.018) \times 10^{-1}$
$e^+ + \nu_e + \tau^- + \bar{\nu}_\tau$	(6.744 ± 0.042)	$\mu^- + \mu^+ + e^- + e^+$	(2.126 ± 0.009)	$\nu_\tau + \bar{\nu}_\tau + c + \bar{c}$	$(6.545 \pm 0.018) \times 10^{-1}$
$e^- + \bar{\nu}_e + \tau^+ + \nu_\tau$	(6.743 ± 0.027)	$s + \bar{s} + b + \bar{b}$	(2.11 ± 0.008)	$\nu_e + \bar{\nu}_e + u + \bar{u}$	$(6.545 \pm 0.018) \times 10^{-1}$
$e^- + \bar{\nu}_e + \gamma + W^+$	(6.548 ± 0.026)	$d + \bar{d} + b + \bar{b}$	(2.11 ± 0.008)	$\nu_e + \bar{\nu}_e + c + \bar{c}$	$(6.545 \pm 0.018) \times 10^{-1}$
$\tau^- + \bar{\nu}_\tau + \gamma + W^+$	(6.538 ± 0.023)	$\mu^- + \mu^- + \mu^+ + \mu^+$	(2.021 ± 0.006)	$s + \bar{s} + t + \bar{t}$	$(6.219 \pm 0.019) \times 10^{-1}$
$\tau^+ + \nu_\tau + \gamma + W^-$	(6.525 ± 0.021)	$b + \bar{b} + \gamma + Z$	(2.012 ± 0.008)	$d + \bar{d} + t + \bar{t}$	$(6.219 \pm 0.019) \times 10^{-1}$
$e^+ + \nu_e + \gamma + W^-$	(6.52 ± 0.021)	$s + \bar{s} + \gamma + \gamma$	(1.714 ± 0.006)	$\gamma + \gamma + \gamma + \gamma$	$(6.21 \pm 0.036) \times 10^{-1}$
$s + \bar{s} + W^+ + W^-$	(5.249 ± 0.024)	$d + \bar{d} + \gamma + \gamma$	(1.714 ± 0.006)	$\nu_\tau + \bar{\nu}_\tau + s + \bar{s}$	$(6.079 \pm 0.018) \times 10^{-1}$
$d + \bar{d} + W^+ + W^-$	(5.249 ± 0.024)	$\nu_\mu + \bar{\nu}_\mu + t + \bar{t}$	(1.626 ± 0.005)	$\nu_\tau + \bar{\nu}_\tau + d + \bar{d}$	$(6.079 \pm 0.018) \times 10^{-1}$
$\tau^- + \bar{\nu}_\tau + W^+ + Z$	(4.535 ± 0.024)	$\tau^- + \tau^+ + W^+ + W^-$	(1.601 ± 0.006)	$\nu_e + \bar{\nu}_e + s + \bar{s}$	$(6.079 \pm 0.018) \times 10^{-1}$
$t + \bar{t} + \gamma + g$	(4.528 ± 0.009)	$u + \bar{u} + c + \bar{c}$	(1.537 ± 0.002)	$\nu_e + \bar{\nu}_e + d + \bar{d}$	$(6.079 \pm 0.018) \times 10^{-1}$
$e^+ + \nu_e + W^- + Z$	(4.509 ± 0.019)	$e^- + e^+ + W^+ + W^-$	(1.524 ± 0.006)	$s + s + \bar{s} + \bar{s}$	$(5.877 \pm 0.022) \times 10^{-1}$
$e^- + \bar{\nu}_e + W^+ + Z$	(4.503 ± 0.018)	$u + \bar{u} + s + \bar{s}$	(1.374 ± 0.007)	$d + d + \bar{d} + \bar{d}$	$(5.877 \pm 0.022) \times 10^{-1}$
$\tau^+ + \nu_\tau + W^- + Z$	(4.477 ± 0.037)	$d + \bar{d} + c + \bar{c}$	(1.372 ± 0.003)	$u + \bar{u} + t + \bar{t}$	$(5.525 \pm 0.015) \times 10^{-1}$
$\mu^- + \mu^+ + s + \bar{s}$	(4.442 ± 0.017)	$\bar{b} + t + h + W^-$	(1.327 ± 0.019)	$c + \bar{c} + t + \bar{t}$	$(5.525 \pm 0.015) \times 10^{-1}$
$\mu^- + \mu^+ + d + \bar{d}$	(4.442 ± 0.017)	$b + \bar{t} + h + W^+$	(1.306 ± 0.014)	$b + \bar{b} + h + g$	$(5.264 \pm 0.026) \times 10^{-1}$
$u + \bar{u} + W^+ + W^-$	(4.376 ± 0.014)	$\mu^+ + \nu_\mu + h + W^-$	(1.279 ± 0.003)	$\tau^- + \tau^+ + b + \bar{b}$	$(5.113 \pm 0.036) \times 10^{-1}$
$c + \bar{c} + W^+ + W^-$	(4.376 ± 0.014)	$\mu^- + \bar{\nu}_\mu + h + W^+$	(1.279 ± 0.004)	$e^- + e^+ + b + \bar{b}$	$(4.936 \pm 0.020) \times 10^{-1}$
$\mu^- + \mu^+ + u + \bar{u}$	(4.076 ± 0.014)	$\nu_\tau + \bar{\nu}_\tau + \gamma + \gamma$	(1.215 ± 0.004)	$\tau^- + \tau^+ + \gamma + Z$	$(4.779 \pm 0.016) \times 10^{-1}$
$\mu^- + \mu^+ + c + \bar{c}$	(4.076 ± 0.014)	$\nu_e + \bar{\nu}_e + \gamma + \gamma$	(1.215 ± 0.004)	$e^- + e^+ + \gamma + Z$	$(4.559 \pm 0.012) \times 10^{-1}$
$b + \bar{t} + W^+ + Z$	(3.669 ± 0.021)	$u + \bar{u} + \gamma + Z$	(1.202 ± 0.002)	$\bar{u} + d + h + W^+$	$(4.494 \pm 0.018) \times 10^{-1}$
$\bar{b} + t + W^- + Z$	(3.655 ± 0.022)	$c + \bar{c} + \gamma + Z$	(1.202 ± 0.002)	$\bar{s} + c + h + W^-$	$(4.49 \pm 0.017) \times 10^{-1}$
$\mu^- + \mu^+ + \nu_\tau + \bar{\nu}_\tau$	(3.646 ± 0.012)	$d + \bar{d} + s + \bar{s}$	(1.159 ± 0.003)	$u + \bar{d} + h + W^-$	$(4.456 \pm 0.015) \times 10^{-1}$
$\mu^- + \mu^+ + \nu_e + \bar{\nu}_e$	(3.646 ± 0.012)	$W^+ + W^+ + W^- + W^-$	(1.137 ± 0.009)	$s + \bar{c} + h + W^+$	$(4.453 \pm 0.018) \times 10^{-1}$
$\nu_e + \bar{\nu}_e + W^+ + W^-$	(3.56 ± 0.016)	$\nu_\tau + \bar{\nu}_\tau + b + \bar{b}$	(1.129 ± 0.004)	$\nu_\tau + \nu_\tau + \bar{\nu}_\tau + \bar{\nu}_\tau$	$(4.234 \pm 0.017) \times 10^{-1}$
$\nu_\tau + \bar{\nu}_\tau + W^+ + W^-$	(3.554 ± 0.016)	$\nu_e + \bar{\nu}_e + b + \bar{b}$	(1.129 ± 0.004)	$\nu_e + \nu_e + \bar{\nu}_e + \bar{\nu}_e$	$(4.234 \pm 0.017) \times 10^{-1}$
$\gamma + \gamma + W^+ + W^-$	(3.328 ± 0.010)	$t + \bar{t} + Z + g$	(1.101 ± 0.003)	$t + \bar{t} + h + g$	$(3.976 \pm 0.012) \times 10^{-1}$
$s + \bar{s} + \gamma + g$	(3.248 ± 0.045)	$s + \bar{s} + Z + g$	(1.064 ± 0.012)	$b + \bar{b} + Z + Z$	$(3.834 \pm 0.022) \times 10^{-1}$
$d + \bar{d} + \gamma + g$	(3.248 ± 0.045)	$d + \bar{d} + Z + g$	(1.064 ± 0.012)	$t + \bar{t} + \gamma + Z$	$(3.656 \pm 0.008) \times 10^{-1}$
$\gamma + W^+ + W^- + Z$	(3.139 ± 0.007)	$s + \bar{s} + \gamma + Z$	(1.053 ± 0.004)	$\tau^- + \tau^+ + u + \bar{u}$	$(3.617 \pm 0.009) \times 10^{-1}$
$\nu_\mu + \bar{\nu}_\mu + h + Z$	(2.973 ± 0.010)	$d + \bar{d} + \gamma + Z$	(1.053 ± 0.004)	$\tau^- + \tau^+ + c + \bar{c}$	$(3.617 \pm 0.009) \times 10^{-1}$
$u + \bar{u} + b + \bar{b}$	(2.839 ± 0.011)	$\tau^- + \tau^+ + \gamma + \gamma$	$(9.924 \pm 0.025) \times 10^{-1}$	$e^- + e^+ + u + \bar{u}$	$(3.577 \pm 0.012) \times 10^{-1}$
$c + \bar{c} + b + \bar{b}$	(2.839 ± 0.011)	$e^- + e^+ + \gamma + \gamma$	$(9.909 \pm 0.029) \times 10^{-1}$	$e^- + e^+ + c + \bar{c}$	$(3.577 \pm 0.012) \times 10^{-1}$
$\mu^- + \mu^+ + \gamma + Z$	(2.757 ± 0.004)	$\nu_\tau + \bar{\nu}_\tau + \gamma + Z$	$(9.663 \pm 0.029) \times 10^{-1}$	$\tau^- + \tau^+ + s + \bar{s}$	$(3.457 \pm 0.016) \times 10^{-1}$
$b + \bar{b} + \gamma + \gamma$	(2.58 ± 0.013)	$\nu_e + \bar{\nu}_e + \gamma + Z$	$(9.663 \pm 0.029) \times 10^{-1}$	$\tau^- + \tau^+ + d + \bar{d}$	$(3.457 \pm 0.016) \times 10^{-1}$
$\mu^- + \mu^+ + \tau^- + \tau^+$	(2.248 ± 0.007)	$\nu_e + \bar{\nu}_e + \nu_\tau + \bar{\nu}_\tau$	$(8.394 \pm 0.027) \times 10^{-1}$	$e^- + e^+ + s + \bar{s}$	$(3.399 \pm 0.018) \times 10^{-1}$
$b + \bar{b} + t + \bar{t}$	(2.235 ± 0.007)	$W^+ + W^- + Z + Z$	$(7.99 \pm 0.038) \times 10^{-1}$	$e^- + e^+ + d + \bar{d}$	$(3.399 \pm 0.018) \times 10^{-1}$
$u + \bar{u} + Z + g$	(2.202 ± 0.013)	$u + u + \bar{u} + \bar{u}$	$(7.861 \pm 0.026) \times 10^{-1}$	$\gamma + \gamma + Z + Z$	$(2.783 \pm 0.013) \times 10^{-1}$

$t + \bar{t} + W^+ + W^-$	$(2.623 \pm 0.008) \times 10^{-1}$	$c + \bar{c} + h + \gamma$	$(3.684 \pm 0.016) \times 10^{-2}$	$h + Z + g + g$	0
$\nu_e + \bar{\nu}_e + \tau^- + \tau^+$	$(2.579 \pm 0.012) \times 10^{-1}$	$h + \gamma + \gamma + Z$	$(3.271 \pm 0.012) \times 10^{-2}$	$g + g + g + g$	0
$e^- + e^+ + \nu_\tau + \bar{\nu}_\tau$	$(2.493 \pm 0.009) \times 10^{-1}$	$u + \bar{u} + h + Z$	$(3.019 \pm 0.018) \times 10^{-2}$	$e^- + e^+ + g + g$	0
$e^- + \bar{\nu}_e + h + W^+$	$(2.416 \pm 0.009) \times 10^{-1}$	$c + \bar{c} + h + Z$	$(3.019 \pm 0.018) \times 10^{-2}$	$\tau^- + \tau^+ + g + g$	0
$\tau^- + \bar{\nu}_\tau + h + W^+$	$(2.404 \pm 0.011) \times 10^{-1}$	$\nu_\tau + \bar{\nu}_\tau + h + Z$	$(2.719 \pm 0.013) \times 10^{-2}$	$\nu_\tau + \bar{\nu}_\tau + g + g$	0
$e^+ + \nu_e + h + W^-$	$(2.403 \pm 0.011) \times 10^{-1}$	$\nu_e + \bar{\nu}_e + h + Z$	$(2.719 \pm 0.013) \times 10^{-2}$	$\nu_\mu + \bar{\nu}_\mu + g + g$	0
$\tau^+ + \nu_\tau + h + W^-$	$(2.396 \pm 0.014) \times 10^{-1}$	$\mu^- + \mu^+ + h + Z$	$(2.083 \pm 0.005) \times 10^{-2}$	$\nu_e + \bar{\nu}_e + g + g$	0
$\mu^- + \mu^+ + t + \bar{t}$	$(2.381 \pm 0.005) \times 10^{-1}$	$\tau^- + \tau^+ + h + Z$	$(1.647 \pm 0.006) \times 10^{-2}$	$\mu^- + \mu^+ + g + g$	0
$\nu_\tau + \bar{\nu}_\tau + t + \bar{t}$	$(2.379 \pm 0.009) \times 10^{-1}$	$h + \gamma + Z + Z$	$(1.615 \pm 0.006) \times 10^{-2}$	$\gamma + g + g + g$	0
$\nu_e + \bar{\nu}_e + t + \bar{t}$	$(2.379 \pm 0.009) \times 10^{-1}$	$t + \bar{t} + h + h$	$(1.558 \pm 0.003) \times 10^{-2}$	$\gamma + \gamma + g + g$	0
$\nu_\mu + \bar{\nu}_\mu + h + h$	$(2.356 \pm 0.015) \times 10^{-1}$	$h + h + W^+ + W^-$	$(1.381 \pm 0.006) \times 10^{-2}$	$\gamma + Z + g + g$	0
$s + \bar{s} + Z + Z$	$(1.834 \pm 0.009) \times 10^{-1}$	$t + t + \bar{t} + \bar{t}$	$(1.266 \pm 0.005) \times 10^{-2}$	$Z + g + g + g$	0
$d + \bar{d} + Z + Z$	$(1.834 \pm 0.009) \times 10^{-1}$	$b + \bar{b} + h + h$	$(1.143 \pm 0.007) \times 10^{-2}$	$Z + Z + g + g$	0
$u + \bar{u} + Z + Z$	$(1.818 \pm 0.010) \times 10^{-1}$	$e^- + e^+ + h + \gamma$	$(1.132 \pm 0.005) \times 10^{-2}$	$W^+ + W^- + g + g$	0
$c + \bar{c} + Z + Z$	$(1.818 \pm 0.010) \times 10^{-1}$	$\tau^- + \tau^+ + h + \gamma$	$(1.115 \pm 0.006) \times 10^{-2}$		
$h + \gamma + W^+ + W^-$	$(1.675 \pm 0.002) \times 10^{-1}$	$e^- + e^+ + h + Z$	$(1.087 \pm 0.003) \times 10^{-2}$		
$\tau^- + \tau^+ + t + \bar{t}$	$(1.674 \pm 0.004) \times 10^{-1}$	$s + \bar{s} + h + h$	$(8.239 \pm 0.060) \times 10^{-3}$		
$b + \bar{b} + h + Z$	$(1.624 \pm 0.007) \times 10^{-1}$	$d + \bar{d} + h + h$	$(8.239 \pm 0.060) \times 10^{-3}$		
$\mu^- + \mu^+ + Z + Z$	$(1.599 \pm 0.004) \times 10^{-1}$	$u + \bar{u} + h + h$	$(6.418 \pm 0.039) \times 10^{-3}$		
$\nu_\tau + \bar{\nu}_\tau + Z + Z$	$(1.497 \pm 0.006) \times 10^{-1}$	$c + \bar{c} + h + h$	$(6.418 \pm 0.039) \times 10^{-3}$		
$\nu_e + \bar{\nu}_e + Z + Z$	$(1.497 \pm 0.006) \times 10^{-1}$	$h + h + \gamma + Z$	$(6.304 \pm 0.047) \times 10^{-3}$		
$e^- + e^+ + \tau^- + \tau^+$	$(1.399 \pm 0.003) \times 10^{-1}$	$\mu^- + \mu^+ + h + h$	$(6.234 \pm 0.036) \times 10^{-3}$		
$t + \bar{t} + h + \gamma$	$(1.381 \pm 0.004) \times 10^{-1}$	$\nu_\tau + \bar{\nu}_\tau + h + h$	$(5.319 \pm 0.023) \times 10^{-3}$		
$e^- + e^+ + t + \bar{t}$	$(1.164 \pm 0.003) \times 10^{-1}$	$\nu_e + \bar{\nu}_e + h + h$	$(5.319 \pm 0.023) \times 10^{-3}$		
$b + \bar{b} + h + \gamma$	$(1.029 \pm 0.006) \times 10^{-1}$	$h + Z + Z + Z$	$(3.547 \pm 0.019) \times 10^{-3}$		
$\mu^- + \mu^+ + h + \gamma$	$(1.008 \pm 0.001) \times 10^{-1}$	$Z + Z + Z + Z$	$(3.053 \pm 0.028) \times 10^{-3}$		
$h + W^+ + W^- + Z$	$(8.722 \pm 0.028) \times 10^{-2}$	$\tau^- + \tau^+ + h + h$	$(2.162 \pm 0.015) \times 10^{-3}$		
$\tau^- + \tau^+ + Z + Z$	$(7.141 \pm 0.046) \times 10^{-2}$	$s + \bar{s} + h + g$	$(2.161 \pm 0.004) \times 10^{-3}$		
$\tau^- + \tau^- + \tau^+ + \tau^+$	$(6.931 \pm 0.037) \times 10^{-2}$	$d + \bar{d} + h + g$	$(2.161 \pm 0.004) \times 10^{-3}$		
$e^- + e^- + e^+ + e^+$	$(6.855 \pm 0.031) \times 10^{-2}$	$e^- + e^+ + h + h$	$(2.145 \pm 0.010) \times 10^{-3}$		
$e^- + e^+ + Z + Z$	$(6.408 \pm 0.037) \times 10^{-2}$	$u + \bar{u} + h + g$	$(1.678 \pm 0.002) \times 10^{-3}$		
$t + \bar{t} + Z + Z$	$(5.467 \pm 0.018) \times 10^{-2}$	$c + \bar{c} + h + g$	$(1.678 \pm 0.002) \times 10^{-3}$		
$t + \bar{t} + h + Z$	$(4.852 \pm 0.015) \times 10^{-2}$	$h + h + h + Z$	$(1.48 \pm 0.009) \times 10^{-3}$		
$\gamma + Z + Z + Z$	$(4.78 \pm 0.033) \times 10^{-2}$	$h + h + Z + Z$	$(1.434 \pm 0.008) \times 10^{-3}$		
$s + \bar{s} + h + \gamma$	$(4.731 \pm 0.025) \times 10^{-2}$	$h + h + h + h$	0		
$d + \bar{d} + h + \gamma$	$(4.731 \pm 0.025) \times 10^{-2}$	$h + h + h + \gamma$	0		
$\nu_\tau + \bar{\nu}_\tau + h + \gamma$	$(4.57 \pm 0.024) \times 10^{-2}$	$h + h + g + g$	0		
$\nu_e + \bar{\nu}_e + h + \gamma$	$(4.57 \pm 0.024) \times 10^{-2}$	$h + h + \gamma + \gamma$	0		
$s + \bar{s} + h + Z$	$(3.696 \pm 0.014) \times 10^{-2}$	$h + g + g + g$	0		
$d + \bar{d} + h + Z$	$(3.696 \pm 0.014) \times 10^{-2}$	$h + \gamma + g + g$	0		
$u + \bar{u} + h + \gamma$	$(3.684 \pm 0.016) \times 10^{-2}$	$h + \gamma + \gamma + \gamma$	0		

Standard Model Processes

$$\sqrt{s} = 3.0 \text{ TeV}$$

Table 2: Lowest order cross sections for two particle final states at $\sqrt{s} = 3.0 \text{ TeV}$. Cone angle 10 degrees. All cross sections in femtobarns.

$\nu_\mu + \bar{\nu}_\mu$	$(5.354 \pm 0.015) \times 10^4$
$\mu^- + \mu^+$	$(4.316 \pm 0.005) \times 10^3$
$W^+ + W^-$	$(4.557 \pm 0.017) \times 10^2$
$\gamma + \gamma$	$(6.348 \pm 0.020) \times 10^1$
$\gamma + Z$	$(4.494 \pm 0.022) \times 10^1$
$Z + Z$	$(2.513 \pm 0.008) \times 10^1$
$t + \bar{t}$	$(1.958 \pm 0.008) \times 10^1$
$u + \bar{u}$	$(1.925 \pm 0.004) \times 10^1$
$c + \bar{c}$	$(1.925 \pm 0.004) \times 10^1$
$\tau^- + \tau^+$	$(1.204 \pm 0.005) \times 10^1$
$e^- + e^+$	$(1.203 \pm 0.002) \times 10^1$
$b + \bar{b}$	(9.842 ± 0.052)
$s + \bar{s}$	(9.83 ± 0.033)
$d + \bar{d}$	(9.83 ± 0.033)
$\nu_\tau + \bar{\nu}_\tau$	(2.717 ± 0.006)
$\nu_e + \bar{\nu}_e$	(2.717 ± 0.006)
$h + Z$	(1.363 ± 0.005)
$h + h$	0
$h + \gamma$	0
$g + g$	0

Table 3: Lowest order cross sections for three particle final states at $\sqrt{s} = 3.0$ TeV. Cone angle 10 degrees. All cross sections in femtobarns.

$\nu_\mu + \bar{\nu}_\mu + \gamma$	$(2.951 \pm 0.014) \times 10^3$	$d + \bar{d} + \gamma$	(3.286 ± 0.018)
$\nu_\mu + \bar{\nu}_\mu + Z$	$(2.101 \pm 0.007) \times 10^3$	$\tau^- + \tau^+ + \gamma$	(2.798 ± 0.007)
$\nu_\mu + \bar{\nu}_\mu + h$	$(4.91 \pm 0.017) \times 10^2$	$e^- + e^+ + \gamma$	(2.789 ± 0.004)
$\mu^- + \bar{\nu}_\mu + W^+$	$(4.191 \pm 0.016) \times 10^2$	$\gamma + Z + Z$	(2.521 ± 0.023)
$\mu^+ + \nu_\mu + W^-$	$(4.187 \pm 0.018) \times 10^2$	$u + \bar{u} + Z$	(2.041 ± 0.011)
$\mu^- + \mu^+ + \gamma$	$(1.713 \pm 0.001) \times 10^2$	$c + \bar{c} + Z$	(2.041 ± 0.011)
$W^+ + W^- + Z$	$(3.16 \pm 0.017) \times 10^1$	$t + \bar{t} + Z$	(1.637 ± 0.007)
$\mu^- + \mu^+ + Z$	$(2.819 \pm 0.015) \times 10^1$	$s + \bar{s} + Z$	(1.421 ± 0.010)
$\gamma + W^+ + W^-$	$(2.727 \pm 0.011) \times 10^1$	$d + \bar{d} + Z$	(1.421 ± 0.010)
$\bar{b} + t + W^-$	$(2.53 \pm 0.231) \times 10^1$	$h + W^+ + W^-$	(1.114 ± 0.006)
$b + \bar{b} + g$	$(2.474 \pm 0.007) \times 10^1$	$\tau^- + \tau^+ + Z$	$(8.095 \pm 0.035) \times 10^{-1}$
$b + \bar{t} + W^+$	$(2.223 \pm 0.025) \times 10^1$	$e^- + e^+ + Z$	$(7.927 \pm 0.029) \times 10^{-1}$
$t + \bar{t} + g$	$(1.84 \pm 0.012) \times 10^1$	$\mu^- + \mu^+ + h$	$(4.885 \pm 0.021) \times 10^{-1}$
$u + \bar{u} + g$	$(1.63 \pm 0.005) \times 10^1$	$t + \bar{t} + h$	$(4.298 \pm 0.012) \times 10^{-1}$
$c + \bar{c} + g$	$(1.63 \pm 0.005) \times 10^1$	$Z + Z + Z$	$(3.338 \pm 0.079) \times 10^{-1}$
$e^+ + \nu_e + W^-$	$(1.615 \pm 0.007) \times 10^1$	$h + \gamma + Z$	$(2.056 \pm 0.010) \times 10^{-1}$
$e^- + \bar{\nu}_e + W^+$	$(1.609 \pm 0.007) \times 10^1$	$b + \bar{b} + h$	$(2.034 \pm 0.011) \times 10^{-1}$
$\tau^+ + \nu_\tau + W^-$	$(1.603 \pm 0.007) \times 10^1$	$\nu_\tau + \bar{\nu}_\tau + h$	$(9.292 \pm 0.014) \times 10^{-2}$
$\bar{u} + d + W^+$	$(1.599 \pm 0.015) \times 10^1$	$\nu_e + \bar{\nu}_e + h$	$(9.292 \pm 0.014) \times 10^{-2}$
$\bar{s} + c + W^-$	$(1.577 \pm 0.011) \times 10^1$	$h + Z + Z$	$(8.07 \pm 0.065) \times 10^{-2}$
$u + \bar{d} + W^-$	$(1.574 \pm 0.009) \times 10^1$	$h + h + Z$	$(3.269 \pm 0.022) \times 10^{-2}$
$s + \bar{c} + W^+$	$(1.562 \pm 0.011) \times 10^1$	$s + \bar{s} + h$	$(2.983 \pm 0.011) \times 10^{-3}$
$\tau^- + \bar{\nu}_\tau + W^+$	$(1.506 \pm 0.010) \times 10^1$	$d + \bar{d} + h$	$(2.983 \pm 0.011) \times 10^{-3}$
$s + \bar{s} + g$	(8.402 ± 0.026)	$u + \bar{u} + h$	$(2.318 \pm 0.007) \times 10^{-3}$
$d + \bar{d} + g$	(8.402 ± 0.026)	$c + \bar{c} + h$	$(2.318 \pm 0.007) \times 10^{-3}$
$b + \bar{b} + \gamma$	(7.546 ± 0.058)	$\tau^- + \tau^+ + h$	$(7.423 \pm 0.030) \times 10^{-4}$
$\gamma + \gamma + \gamma$	(5.525 ± 0.023)	$e^- + e^+ + h$	$(7.343 \pm 0.021) \times 10^{-4}$
$u + \bar{u} + \gamma$	(5.448 ± 0.018)	$h + h + h$	0
$c + \bar{c} + \gamma$	(5.448 ± 0.018)	$h + h + \gamma$	0
$\gamma + \gamma + Z$	(5.379 ± 0.023)	$h + g + g$	0
$b + \bar{b} + Z$	(3.914 ± 0.022)	$h + \gamma + \gamma$	0
$t + \bar{t} + \gamma$	(3.881 ± 0.033)	$g + g + g$	0
$\nu_\tau + \bar{\nu}_\tau + Z$	(3.768 ± 0.010)	$\gamma + g + g$	0
$\nu_e + \bar{\nu}_e + Z$	(3.768 ± 0.010)	$Z + g + g$	0
$\nu_\tau + \bar{\nu}_\tau + \gamma$	(3.38 ± 0.013)		
$\nu_e + \bar{\nu}_e + \gamma$	(3.38 ± 0.013)		
$s + \bar{s} + \gamma$	(3.286 ± 0.018)		

Table 4: Lowest order cross sections for four particle final states at $\sqrt{s} = 3.0$ TeV. Cone angle 10 degrees. All cross sections in femtobarns.

$\nu_\mu + \bar{\nu}_\mu + b + \bar{b}$	$(5.422 \pm 0.034) \times 10^2$	$b + \bar{b} + \gamma + g$	(7.916 ± 0.180)
$\nu_\mu + \bar{\nu}_\mu + s + \bar{s}$	$(2.097 \pm 0.007) \times 10^2$	$\nu_\mu + \bar{\nu}_\mu + t + \bar{t}$	(5.013 ± 0.025)
$\nu_\mu + \bar{\nu}_\mu + d + \bar{d}$	$(2.097 \pm 0.007) \times 10^2$	$\mu^- + \mu^+ + \gamma + \gamma$	(4.539 ± 0.011)
$\nu_\mu + \bar{\nu}_\mu + u + \bar{u}$	$(1.634 \pm 0.005) \times 10^2$	$b + \bar{b} + Z + g$	(4.449 ± 0.082)
$\nu_\mu + \bar{\nu}_\mu + c + \bar{c}$	$(1.634 \pm 0.005) \times 10^2$	$\bar{b} + t + \gamma + W^-$	(4.32 ± 0.142)
$\nu_\mu + \bar{\nu}_\mu + \nu_e + \bar{\nu}_e$	$(1.44 \pm 0.006) \times 10^2$	$s + \bar{s} + g + g$	(4.223 ± 0.015)
$\nu_\mu + \bar{\nu}_\mu + \nu_\tau + \bar{\nu}_\tau$	$(1.44 \pm 0.006) \times 10^2$	$d + \bar{d} + g + g$	(4.223 ± 0.015)
$\nu_\mu + \nu_\mu + \bar{\nu}_\mu + \bar{\nu}_\mu$	$(1.429 \pm 0.004) \times 10^2$	$b + \bar{t} + \gamma + W^+$	(4.129 ± 0.026)
$\mu^- + \mu^+ + \nu_\mu + \bar{\nu}_\mu$	$(1.411 \pm 0.003) \times 10^2$	$s + \bar{s} + c + \bar{c}$	(3.408 ± 0.021)
$\nu_\mu + \bar{\nu}_\mu + \gamma + Z$	$(1.29 \pm 0.002) \times 10^2$	$u + \bar{u} + d + \bar{d}$	(3.407 ± 0.022)
$\nu_\mu + \bar{\nu}_\mu + W^+ + W^-$	$(1.23 \pm 0.003) \times 10^2$	$s + \bar{c} + W^+ + Z$	(3.25 ± 0.011)
$\mu^- + \bar{\nu}_\mu + u + \bar{d}$	$(8.546 \pm 0.028) \times 10^1$	$\bar{s} + c + W^- + Z$	(3.24 ± 0.012)
$\mu^- + \bar{\nu}_\mu + \bar{s} + c$	$(8.54 \pm 0.029) \times 10^1$	$u + \bar{d} + W^- + Z$	(3.228 ± 0.009)
$\mu^+ + \nu_\mu + \bar{u} + d$	$(8.531 \pm 0.027) \times 10^1$	$\bar{u} + d + W^+ + Z$	(3.219 ± 0.011)
$\mu^+ + \nu_\mu + s + \bar{c}$	$(8.503 \pm 0.027) \times 10^1$	$u + \bar{d} + \gamma + W^-$	(3.164 ± 0.015)
$\nu_\mu + \bar{\nu}_\mu + \gamma + \gamma$	$(8.382 \pm 0.017) \times 10^1$	$\bar{s} + c + \gamma + W^-$	(3.159 ± 0.012)
$\nu_\mu + \bar{\nu}_\mu + \tau^- + \tau^+$	$(7.478 \pm 0.025) \times 10^1$	$\mu^- + \bar{\nu}_\mu + \bar{b} + t$	(3.155 ± 0.070)
$\nu_\mu + \bar{\nu}_\mu + e^- + e^+$	$(5.829 \pm 0.017) \times 10^1$	$s + \bar{c} + \gamma + W^+$	(3.151 ± 0.012)
$\nu_\mu + \bar{\nu}_\mu + Z + Z$	$(5.29 \pm 0.031) \times 10^1$	$\bar{u} + d + \gamma + W^+$	(3.12 ± 0.015)
$\mu^- + \bar{\nu}_\mu + e^+ + \nu_e$	$(4.149 \pm 0.014) \times 10^1$	$\bar{s} + c + W^- + g$	(3.072 ± 0.018)
$\mu^+ + \nu_\mu + e^- + \bar{\nu}_e$	$(4.14 \pm 0.014) \times 10^1$	$\mu^- + \mu^+ + b + \bar{b}$	(3.065 ± 0.015)
$\mu^+ + \nu_\mu + \tau^- + \bar{\nu}_\tau$	$(4.139 \pm 0.023) \times 10^1$	$\mu^+ + \nu_\mu + b + \bar{t}$	(3.065 ± 0.041)
$\mu^- + \bar{\nu}_\mu + \tau^+ + \nu_\tau$	$(4.122 \pm 0.020) \times 10^1$	$\bar{u} + d + \bar{s} + c$	(3.031 ± 0.023)
$b + \bar{b} + W^+ + W^-$	$(3.206 \pm 0.114) \times 10^1$	$u + \bar{d} + W^- + g$	(3.029 ± 0.023)
$b + \bar{t} + W^+ + g$	$(3.006 \pm 0.302) \times 10^1$	$u + \bar{d} + s + \bar{c}$	(3.028 ± 0.019)
$\mu^- + \bar{\nu}_\mu + \gamma + W^+$	$(2.874 \pm 0.006) \times 10^1$	$s + \bar{c} + W^+ + g$	(2.972 ± 0.013)
$\mu^+ + \nu_\mu + \gamma + W^-$	$(2.848 \pm 0.005) \times 10^1$	$\bar{u} + d + W^+ + g$	(2.931 ± 0.019)
$\bar{b} + t + W^- + g$	$(2.786 \pm 0.047) \times 10^1$	$t + \bar{t} + \gamma + g$	(2.922 ± 0.006)
$\mu^- + \mu^+ + W^+ + W^-$	$(2.435 \pm 0.009) \times 10^1$	$u + \bar{u} + \gamma + g$	(2.873 ± 0.008)
$b + \bar{b} + g + g$	$(2.307 \pm 0.032) \times 10^1$	$c + \bar{c} + \gamma + g$	(2.873 ± 0.008)
$\nu_\mu + \bar{\nu}_\mu + h + \gamma$	$(2.23 \pm 0.004) \times 10^1$	$\gamma + W^+ + W^- + Z$	(2.817 ± 0.011)
$\mu^+ + \nu_\mu + W^- + Z$	$(2.047 \pm 0.004) \times 10^1$	$e^+ + \nu_e + \gamma + W^-$	(2.722 ± 0.009)
$\mu^- + \bar{\nu}_\mu + W^+ + Z$	$(2.044 \pm 0.006) \times 10^1$	$e^- + \bar{\nu}_e + \gamma + W^+$	(2.71 ± 0.009)
$\nu_\mu + \bar{\nu}_\mu + h + Z$	(9.396 ± 0.030)	$\tau^- + \bar{\nu}_\tau + \gamma + W^+$	(2.708 ± 0.014)
$t + \bar{t} + g + g$	(9.1 ± 0.033)	$\tau^+ + \nu_\tau + \gamma + W^-$	(2.701 ± 0.011)
$u + \bar{u} + g + g$	(8.265 ± 0.032)	$s + \bar{c} + \bar{b} + t$	(2.609 ± 0.028)
$c + \bar{c} + g + g$	(8.265 ± 0.032)	$\bar{u} + d + \bar{b} + t$	(2.586 ± 0.021)
		$\bar{s} + c + b + \bar{t}$	(2.571 ± 0.020)
		$u + \bar{d} + b + \bar{t}$	(2.57 ± 0.015)
		$s + \bar{s} + W^+ + W^-$	(2.568 ± 0.009)
		$d + \bar{d} + W^+ + W^-$	(2.568 ± 0.009)

$e^+ + \nu_e + W^- + Z$	(2.51 ± 0.009)	$s + \bar{s} + \gamma + g$	$(9.128 \pm 0.062) \times 10^{-1}$	$s + \bar{s} + \gamma + Z$	$(2.748 \pm 0.010) \times 10^{-1}$
$\tau^+ + \nu_\tau + W^- + Z$	(2.497 ± 0.010)	$d + \bar{d} + \gamma + g$	$(9.128 \pm 0.062) \times 10^{-1}$	$d + \bar{d} + \gamma + Z$	$(2.748 \pm 0.010) \times 10^{-1}$
$e^- + \bar{\nu}_e + W^+ + Z$	(2.491 ± 0.011)	$b + \bar{b} + t + \bar{t}$	$(8.967 \pm 0.098) \times 10^{-1}$	$t + \bar{t} + h + g$	$(2.636 \pm 0.004) \times 10^{-1}$
$\tau^- + \bar{\nu}_\tau + W^+ + Z$	(2.482 ± 0.011)	$b + \bar{b} + \gamma + \gamma$	$(8.419 \pm 0.045) \times 10^{-1}$	$t + \bar{t} + \gamma + Z$	$(2.43 \pm 0.004) \times 10^{-1}$
$e^- + \bar{\nu}_e + \bar{b} + t$	(2.337 ± 0.046)	$\nu_\mu + \bar{\nu}_\mu + h + h$	$(8.379 \pm 0.039) \times 10^{-1}$	$d + \bar{d} + s + \bar{s}$	$(2.368 \pm 0.007) \times 10^{-1}$
$e^+ + \nu_e + b + \bar{t}$	(2.32 ± 0.046)	$u + \bar{u} + b + \bar{b}$	$(7.91 \pm 0.058) \times 10^{-1}$	$\gamma + \gamma + \gamma + \gamma$	$(2.359 \pm 0.010) \times 10^{-1}$
$\nu_\tau + \bar{\nu}_\tau + W^+ + W^-$	(2.282 ± 0.011)	$c + \bar{c} + b + \bar{b}$	$(7.91 \pm 0.058) \times 10^{-1}$	$s + \bar{s} + t + \bar{t}$	$(2.269 \pm 0.007) \times 10^{-1}$
$\nu_e + \bar{\nu}_e + W^+ + W^-$	(2.281 ± 0.011)	$\mu^- + \mu^+ + \tau^- + \tau^+$	$(7.605 \pm 0.036) \times 10^{-1}$	$d + \bar{d} + t + \bar{t}$	$(2.269 \pm 0.007) \times 10^{-1}$
$\tau^+ + \nu_\tau + b + \bar{t}$	(2.258 ± 0.083)	$\mu^- + \mu^+ + e^- + e^+$	$(7.576 \pm 0.033) \times 10^{-1}$	$u + \bar{u} + t + \bar{t}$	$(2.127 \pm 0.009) \times 10^{-1}$
$\tau^- + \bar{\nu}_\tau + \bar{b} + t$	(2.248 ± 0.041)	$\tau^- + \tau^+ + W^+ + W^-$	$(7.555 \pm 0.033) \times 10^{-1}$	$c + \bar{c} + t + \bar{t}$	$(2.127 \pm 0.009) \times 10^{-1}$
$u + \bar{u} + W^+ + W^-$	(2.168 ± 0.007)	$e^- + e^+ + W^+ + W^-$	$(7.382 \pm 0.024) \times 10^{-1}$	$u + u + \bar{u} + \bar{u}$	$(2.068 \pm 0.005) \times 10^{-1}$
$c + \bar{c} + W^+ + W^-$	(2.168 ± 0.007)	$\mu^- + \mu^- + \mu^+ + \mu^+$	$(7.264 \pm 0.028) \times 10^{-1}$	$c + c + \bar{c} + \bar{c}$	$(2.068 \pm 0.005) \times 10^{-1}$
$\gamma + \gamma + W^+ + W^-$	(2.111 ± 0.011)	$b + \bar{b} + \gamma + Z$	$(6.876 \pm 0.041) \times 10^{-1}$	$b + \bar{b} + h + g$	$(1.639 \pm 0.007) \times 10^{-1}$
$\mu^- + \mu^+ + \nu_\tau + \bar{\nu}_\tau$	(1.955 ± 0.006)	$b + b + \bar{b} + \bar{b}$	$(6.132 \pm 0.056) \times 10^{-1}$	$b + \bar{b} + Z + Z$	$(1.632 \pm 0.014) \times 10^{-1}$
$\mu^- + \mu^+ + \nu_e + \bar{\nu}_e$	(1.955 ± 0.006)	$u + \bar{u} + \gamma + \gamma$	$(5.879 \pm 0.032) \times 10^{-1}$	$\nu_\tau + \bar{\nu}_\tau + u + \bar{u}$	$(1.631 \pm 0.015) \times 10^{-1}$
$\tau^- + \bar{\nu}_\tau + u + \bar{d}$	(1.908 ± 0.018)	$c + \bar{c} + \gamma + \gamma$	$(5.879 \pm 0.032) \times 10^{-1}$	$\nu_\tau + \bar{\nu}_\tau + c + \bar{c}$	$(1.631 \pm 0.015) \times 10^{-1}$
$e^- + \bar{\nu}_e + u + \bar{d}$	(1.905 ± 0.010)	$s + \bar{s} + b + \bar{b}$	$(5.042 \pm 0.030) \times 10^{-1}$	$\nu_e + \bar{\nu}_e + u + \bar{u}$	$(1.631 \pm 0.015) \times 10^{-1}$
$e^- + \bar{\nu}_e + \bar{s} + c$	(1.897 ± 0.011)	$d + \bar{d} + b + \bar{b}$	$(5.042 \pm 0.030) \times 10^{-1}$	$\nu_e + \bar{\nu}_e + c + \bar{c}$	$(1.631 \pm 0.015) \times 10^{-1}$
$\tau^- + \bar{\nu}_\tau + \bar{s} + c$	(1.884 ± 0.013)	$\bar{b} + t + h + W^-$	$(4.562 \pm 0.225) \times 10^{-1}$	$\tau^- + \tau^+ + \gamma + Z$	$(1.475 \pm 0.004) \times 10^{-1}$
$e^+ + \nu_e + \bar{u} + d$	(1.867 ± 0.011)	$b + \bar{t} + h + W^+$	$(4.321 \pm 0.188) \times 10^{-1}$	$\mu^- + \mu^+ + Z + Z$	$(1.467 \pm 0.006) \times 10^{-1}$
$e^+ + \nu_e + s + \bar{c}$	(1.865 ± 0.011)	$\nu_\tau + \bar{\nu}_\tau + \gamma + \gamma$	$(3.996 \pm 0.017) \times 10^{-1}$	$e^- + e^+ + \gamma + Z$	$(1.449 \pm 0.003) \times 10^{-1}$
$\tau^+ + \nu_\tau + s + \bar{c}$	(1.854 ± 0.012)	$\nu_e + \bar{\nu}_e + \gamma + \gamma$	$(3.996 \pm 0.017) \times 10^{-1}$	$\gamma + \gamma + Z + Z$	$(1.414 \pm 0.012) \times 10^{-1}$
$e^- + e^+ + \nu_e + \bar{\nu}_e$	(1.849 ± 0.006)	$u + \bar{u} + \gamma + Z$	$(3.905 \pm 0.018) \times 10^{-1}$	$\nu_\tau + \nu_\tau + \bar{\nu}_\tau + \bar{\nu}_\tau$	$(1.404 \pm 0.007) \times 10^{-1}$
$\tau^- + \tau^+ + \nu_\tau + \bar{\nu}_\tau$	(1.843 ± 0.012)	$c + \bar{c} + \gamma + Z$	$(3.905 \pm 0.018) \times 10^{-1}$	$\nu_e + \nu_e + \bar{\nu}_e + \bar{\nu}_e$	$(1.404 \pm 0.007) \times 10^{-1}$
$\tau^+ + \nu_\tau + \bar{u} + d$	(1.833 ± 0.010)	$u + \bar{u} + c + \bar{c}$	$(3.894 \pm 0.011) \times 10^{-1}$	$\mu^- + \mu^+ + t + \bar{t}$	$(1.29 \pm 0.002) \times 10^{-1}$
$e^- + \bar{\nu}_e + \tau^+ + \nu_\tau$	(1.783 ± 0.008)	$\nu_\tau + \bar{\nu}_\tau + \gamma + Z$	$(3.855 \pm 0.016) \times 10^{-1}$	$\nu_\tau + \bar{\nu}_\tau + s + \bar{s}$	$(1.24 \pm 0.008) \times 10^{-1}$
$e^+ + \nu_e + \tau^- + \bar{\nu}_\tau$	(1.782 ± 0.008)	$\nu_e + \bar{\nu}_e + \gamma + Z$	$(3.855 \pm 0.016) \times 10^{-1}$	$\nu_\tau + \bar{\nu}_\tau + d + \bar{d}$	$(1.24 \pm 0.008) \times 10^{-1}$
$\mu^- + \mu^+ + s + \bar{s}$	(1.777 ± 0.007)	$s + \bar{s} + Z + g$	$(3.803 \pm 0.031) \times 10^{-1}$	$\nu_e + \bar{\nu}_e + s + \bar{s}$	$(1.24 \pm 0.008) \times 10^{-1}$
$\mu^- + \mu^+ + d + \bar{d}$	(1.777 ± 0.007)	$d + \bar{d} + Z + g$	$(3.803 \pm 0.031) \times 10^{-1}$	$\nu_e + \bar{\nu}_e + d + \bar{d}$	$(1.24 \pm 0.008) \times 10^{-1}$
$b + \bar{t} + W^+ + Z$	(1.763 ± 0.016)	$s + \bar{s} + \gamma + \gamma$	$(3.681 \pm 0.019) \times 10^{-1}$	$s + s + \bar{s} + \bar{s}$	$(1.221 \pm 0.004) \times 10^{-1}$
$\bar{b} + t + W^- + Z$	(1.734 ± 0.015)	$d + \bar{d} + \gamma + \gamma$	$(3.681 \pm 0.019) \times 10^{-1}$	$d + d + \bar{d} + \bar{d}$	$(1.221 \pm 0.004) \times 10^{-1}$
$\mu^- + \mu^+ + \gamma + Z$	(1.652 ± 0.005)	$t + \bar{t} + \gamma + \gamma$	$(3.397 \pm 0.006) \times 10^{-1}$	$\nu_\tau + \bar{\nu}_\tau + t + \bar{t}$	$(1.124 \pm 0.004) \times 10^{-1}$
$\mu^- + \mu^+ + u + \bar{u}$	(1.589 ± 0.006)	$t + \bar{t} + W^+ + W^-$	$(3.266 \pm 0.011) \times 10^{-1}$	$\nu_e + \bar{\nu}_e + t + \bar{t}$	$(1.124 \pm 0.004) \times 10^{-1}$
$\mu^- + \mu^+ + c + \bar{c}$	(1.589 ± 0.006)	$u + \bar{u} + s + \bar{s}$	$(3.239 \pm 0.010) \times 10^{-1}$	$e^- + e^+ + b + \bar{b}$	$(1.105 \pm 0.006) \times 10^{-1}$
$W^+ + W^+ + W^- + W^-$	(1.4 ± 0.017)	$d + \bar{d} + c + \bar{c}$	$(3.196 \pm 0.008) \times 10^{-1}$	$\tau^- + \tau^+ + b + \bar{b}$	$(1.103 \pm 0.011) \times 10^{-1}$
$\mu^- + \bar{\nu}_\mu + h + W^+$	(1.192 ± 0.003)	$\nu_\tau + \bar{\nu}_\tau + b + \bar{b}$	$(3.059 \pm 0.030) \times 10^{-1}$	$u + \bar{d} + h + W^-$	$(1.095 \pm 0.003) \times 10^{-1}$
$\mu^+ + \nu_\mu + h + W^-$	(1.176 ± 0.004)	$\nu_e + \bar{\nu}_e + b + \bar{b}$	$(3.059 \pm 0.030) \times 10^{-1}$	$\bar{u} + d + h + W^+$	$(1.088 \pm 0.002) \times 10^{-1}$
$W^+ + W^- + Z + Z$	(1.118 ± 0.010)	$e^- + e^+ + \gamma + \gamma$	$(2.838 \pm 0.007) \times 10^{-1}$	$\bar{s} + c + h + W^-$	$(1.086 \pm 0.003) \times 10^{-1}$
$t + \bar{t} + Z + g$	(1.001 ± 0.003)	$\gamma + \gamma + \gamma + Z$	$(2.819 \pm 0.025) \times 10^{-1}$	$s + \bar{c} + h + W^+$	$(1.083 \pm 0.003) \times 10^{-1}$
$u + \bar{u} + Z + g$	$(9.436 \pm 0.043) \times 10^{-1}$	$\tau^- + \tau^+ + \gamma + \gamma$	$(2.813 \pm 0.010) \times 10^{-1}$	$h + \gamma + W^+ + W^-$	$(9.998 \pm 0.033) \times 10^{-2}$
$c + \bar{c} + Z + g$	$(9.436 \pm 0.043) \times 10^{-1}$	$\nu_e + \bar{\nu}_e + \nu_\tau + \bar{\nu}_\tau$	$(2.81 \pm 0.019) \times 10^{-1}$	$e^- + \bar{\nu}_e + h + W^+$	$(9.267 \pm 0.041) \times 10^{-2}$

$e^+ + \nu_e + h + W^-$	$(9.248 \pm 0.044) \times 10^{-2}$	$\mu^- + \mu^+ + h + Z$	$(1.026 \pm 0.003) \times 10^{-2}$	$h + Z + g + g$	0
$\tau^+ + \nu_\tau + h + W^-$	$(9.232 \pm 0.033) \times 10^{-2}$	$s + \bar{s} + h + Z$	$(8.496 \pm 0.037) \times 10^{-3}$	$g + g + g + g$	0
$\tau^- + \bar{\nu}_\tau + h + W^+$	$(9.194 \pm 0.030) \times 10^{-2}$	$d + \bar{d} + h + Z$	$(8.496 \pm 0.037) \times 10^{-3}$	$e^- + e^+ + g + g$	0
$h + W^+ + W^- + Z$	$(8.6 \pm 0.030) \times 10^{-2}$	$h + h + h + Z$	$(8.255 \pm 0.061) \times 10^{-3}$	$\tau^- + \tau^+ + g + g$	0
$\nu_\tau + \bar{\nu}_\tau + Z + Z$	$(8.078 \pm 0.059) \times 10^{-2}$	$h + \gamma + Z + Z$	$(8.204 \pm 0.033) \times 10^{-3}$	$\nu_\tau + \bar{\nu}_\tau + g + g$	0
$\nu_e + \bar{\nu}_e + Z + Z$	$(8.078 \pm 0.059) \times 10^{-2}$	$u + \bar{u} + h + Z$	$(7.284 \pm 0.035) \times 10^{-3}$	$\nu_\mu + \bar{\nu}_\mu + g + g$	0
$u + \bar{u} + Z + Z$	$(7.663 \pm 0.038) \times 10^{-2}$	$c + \bar{c} + h + Z$	$(7.284 \pm 0.035) \times 10^{-3}$	$\nu_e + \bar{\nu}_e + g + g$	0
$c + \bar{c} + Z + Z$	$(7.663 \pm 0.038) \times 10^{-2}$	$t + \bar{t} + h + h$	$(6.545 \pm 0.013) \times 10^{-3}$	$\mu^- + \mu^+ + g + g$	0
$\tau^- + \tau^+ + u + \bar{u}$	$(7.491 \pm 0.031) \times 10^{-2}$	$s + \bar{s} + h + \gamma$	$(5.752 \pm 0.036) \times 10^{-3}$	$\gamma + g + g + g$	0
$\tau^- + \tau^+ + c + \bar{c}$	$(7.491 \pm 0.031) \times 10^{-2}$	$d + \bar{d} + h + \gamma$	$(5.752 \pm 0.036) \times 10^{-3}$	$\gamma + \gamma + g + g$	0
$e^- + e^+ + u + \bar{u}$	$(7.487 \pm 0.020) \times 10^{-2}$	$b + \bar{b} + h + h$	$(4.989 \pm 0.051) \times 10^{-3}$	$\gamma + Z + g + g$	0
$e^- + e^+ + c + \bar{c}$	$(7.487 \pm 0.020) \times 10^{-2}$	$u + \bar{u} + h + \gamma$	$(4.556 \pm 0.028) \times 10^{-3}$	$Z + g + g + g$	0
$t + \bar{t} + h + \gamma$	$(6.703 \pm 0.026) \times 10^{-2}$	$c + \bar{c} + h + \gamma$	$(4.556 \pm 0.028) \times 10^{-3}$	$Z + Z + g + g$	0
$s + \bar{s} + Z + Z$	$(6.647 \pm 0.043) \times 10^{-2}$	$h + h + \gamma + Z$	$(3.429 \pm 0.020) \times 10^{-3}$	$W^+ + W^- + g + g$	0
$d + \bar{d} + Z + Z$	$(6.647 \pm 0.043) \times 10^{-2}$	$\tau^- + \tau^+ + h + Z$	$(3.385 \pm 0.014) \times 10^{-3}$		
$b + \bar{b} + h + Z$	$(6.545 \pm 0.033) \times 10^{-2}$	$\mu^- + \mu^+ + h + h$	$(3.186 \pm 0.019) \times 10^{-3}$		
$\nu_e + \bar{\nu}_e + \tau^- + \tau^+$	$(6.326 \pm 0.022) \times 10^{-2}$	$s + \bar{s} + h + h$	$(2.914 \pm 0.031) \times 10^{-3}$		
$e^- + e^+ + s + \bar{s}$	$(6.299 \pm 0.026) \times 10^{-2}$	$d + \bar{d} + h + h$	$(2.914 \pm 0.031) \times 10^{-3}$		
$e^- + e^+ + d + \bar{d}$	$(6.299 \pm 0.026) \times 10^{-2}$	$e^- + e^+ + h + Z$	$(2.661 \pm 0.016) \times 10^{-3}$		
$\tau^- + \tau^+ + s + \bar{s}$	$(6.217 \pm 0.027) \times 10^{-2}$	$Z + Z + Z + Z$	$(2.597 \pm 0.036) \times 10^{-3}$		
$\tau^- + \tau^+ + d + \bar{d}$	$(6.217 \pm 0.027) \times 10^{-2}$	$h + Z + Z + Z$	$(2.593 \pm 0.017) \times 10^{-3}$		
$e^- + e^+ + \nu_\tau + \bar{\nu}_\tau$	$(6.203 \pm 0.047) \times 10^{-2}$	$\nu_\tau + \bar{\nu}_\tau + h + h$	$(2.264 \pm 0.015) \times 10^{-3}$		
$t + \bar{t} + Z + Z$	$(4.821 \pm 0.017) \times 10^{-2}$	$\nu_e + \bar{\nu}_e + h + h$	$(2.264 \pm 0.015) \times 10^{-3}$		
$\tau^- + \tau^+ + t + \bar{t}$	$(4.778 \pm 0.013) \times 10^{-2}$	$u + \bar{u} + h + h$	$(2.261 \pm 0.016) \times 10^{-3}$		
$e^- + e^+ + t + \bar{t}$	$(3.758 \pm 0.012) \times 10^{-2}$	$c + \bar{c} + h + h$	$(2.261 \pm 0.016) \times 10^{-3}$		
$\gamma + Z + Z + Z$	$(3.213 \pm 0.027) \times 10^{-2}$	$e^- + e^+ + h + \gamma$	$(1.417 \pm 0.007) \times 10^{-3}$		
$b + \bar{b} + h + \gamma$	$(3.139 \pm 0.015) \times 10^{-2}$	$\tau^- + \tau^+ + h + \gamma$	$(1.406 \pm 0.009) \times 10^{-3}$		
$t + \bar{t} + h + Z$	$(3.112 \pm 0.007) \times 10^{-2}$	$h + h + Z + Z$	$(9.627 \pm 0.049) \times 10^{-4}$		
$e^- + e^+ + \tau^- + \tau^+$	$(2.908 \pm 0.007) \times 10^{-2}$	$\tau^- + \tau^+ + h + h$	$(7.479 \pm 0.065) \times 10^{-4}$		
$\tau^- + \tau^+ + Z + Z$	$(2.667 \pm 0.018) \times 10^{-2}$	$e^- + e^+ + h + h$	$(7.477 \pm 0.043) \times 10^{-4}$		
$e^- + e^+ + Z + Z$	$(2.51 \pm 0.014) \times 10^{-2}$	$s + \bar{s} + h + g$	$(5.556 \pm 0.034) \times 10^{-5}$		
$t + t + \bar{t} + \bar{t}$	$(2.111 \pm 0.022) \times 10^{-2}$	$d + \bar{d} + h + g$	$(5.556 \pm 0.034) \times 10^{-5}$		
$\mu^- + \mu^+ + h + \gamma$	$(1.811 \pm 0.003) \times 10^{-2}$	$u + \bar{u} + h + g$	$(4.35 \pm 0.031) \times 10^{-5}$		
$e^- + e^- + e^+ + e^+$	$(1.444 \pm 0.004) \times 10^{-2}$	$c + \bar{c} + h + g$	$(4.35 \pm 0.031) \times 10^{-5}$		
$\tau^- + \tau^- + \tau^+ + \tau^+$	$(1.431 \pm 0.009) \times 10^{-2}$	$h + h + h + h$	0		
$\nu_\tau + \bar{\nu}_\tau + h + \gamma$	$(1.394 \pm 0.008) \times 10^{-2}$	$h + h + h + \gamma$	0		
$\nu_e + \bar{\nu}_e + h + \gamma$	$(1.394 \pm 0.008) \times 10^{-2}$	$h + h + g + g$	0		
$h + \gamma + \gamma + Z$	$(1.284 \pm 0.004) \times 10^{-2}$	$h + h + \gamma + \gamma$	0		
$\nu_\tau + \bar{\nu}_\tau + h + Z$	$(1.139 \pm 0.010) \times 10^{-2}$	$h + g + g + g$	0		
$\nu_e + \bar{\nu}_e + h + Z$	$(1.139 \pm 0.010) \times 10^{-2}$	$h + \gamma + g + g$	0		
$h + h + W^+ + W^-$	$(1.044 \pm 0.005) \times 10^{-2}$	$h + \gamma + \gamma + \gamma$	0		

MSSM $\sqrt{s} = 3.0 \text{ TeV}$

Table 2: Lowest order cross sections for two particle final states at $\sqrt{s} = 3.0 \text{ TeV}$. Cone angle 10 degrees. All cross sections in femtobarns.

$\bar{\nu}_\mu + \bar{\nu}_\mu$	$(1.477 \pm 0.003) \times 10^2$	$\bar{t}_R + \bar{t}_L$	$(7.253 \pm 0.003) \times 10^{-1}$
$\bar{\mu}_R + \bar{\mu}_R$	$(5.663 \pm 0.015) \times 10^1$	$\bar{t}_L + \bar{t}_R$	$(7.253 \pm 0.003) \times 10^{-1}$
$\bar{\mu}_L + \bar{\mu}_L$	$(4.789 \pm 0.011) \times 10^1$	$\bar{N}_1 + \bar{N}_4$	$(6.646 \pm 0.020) \times 10^{-1}$
$\bar{C}_1^+ + \bar{C}_1^-$	$(2.084 \pm 0.008) \times 10^1$	$\bar{b}_R + \bar{b}_L$	$(3.494 \pm 0.001) \times 10^{-1}$
$\bar{N}_1 + \bar{N}_1$	$(1.335 \pm 0.005) \times 10^1$	$\bar{b}_L + \bar{b}_R$	$(3.494 \pm 0.001) \times 10^{-1}$
$\bar{C}_2^+ + \bar{C}_2^-$	$(1.239 \pm 0.006) \times 10^1$	$\bar{N}_1 + \bar{N}_3$	$(3.0 \pm 0.009) \times 10^{-1}$
$\bar{N}_2 + \bar{N}_2$	(8.658 ± 0.035)	$\bar{\tau}_R^- + \bar{\tau}_L^+$	$(9.768 \pm 0.005) \times 10^{-2}$
$\bar{N}_1 + \bar{N}_2$	(4.872 ± 0.018)	$\bar{\tau}_L^- + \bar{\tau}_R^+$	$(9.768 \pm 0.005) \times 10^{-2}$
$\bar{u}_L + \bar{u}_L$	(4.762 ± 0.010)	$\bar{N}_4 + \bar{N}_4$	$(6.006 \pm 0.019) \times 10^{-2}$
$\bar{c}_L + \bar{c}_L$	(4.762 ± 0.010)	$\bar{N}_3 + \bar{N}_3$	$(2.027 \pm 0.007) \times 10^{-3}$
$\bar{N}_3 + \bar{N}_4$	(4.462 ± 0.020)	$H + Z$	$(1.747 \pm 0.007) \times 10^{-4}$
$\bar{\mu}_R^- + \bar{\mu}_L^+$	(3.59 ± 0.002)	$h + A$	$(1.725 \pm 0.000) \times 10^{-4}$
$\bar{\mu}_L^- + \bar{\mu}_R^+$	(3.59 ± 0.002)	$h + h$	0
$\bar{t}_R + \bar{t}_R$	(3.491 ± 0.006)	$h + \gamma$	0
$\bar{t}_L + \bar{t}_L$	(3.302 ± 0.002)	$h + H$	0
$\bar{s}_L + \bar{s}_L$	(3.201 ± 0.007)	$\bar{u}_R + \bar{u}_L$	0
$\bar{d}_L + \bar{d}_L$	(3.201 ± 0.007)	$\bar{u}_L + \bar{u}_R$	0
$\bar{e}_L^- + \bar{e}_L^+$	(3.199 ± 0.005)	$\bar{s}_R + \bar{s}_L$	0
$\bar{u}_R + \bar{u}_R$	(3.164 ± 0.005)	$\bar{s}_L + \bar{s}_R$	0
$\bar{c}_R + \bar{c}_R$	(3.164 ± 0.005)	$\bar{g} + \bar{g}$	0
$\bar{\tau}_R^- + \bar{\tau}_R^+$	(3.072 ± 0.005)	$\bar{e}_R^- + \bar{e}_L^+$	0
$H^+ + H^-$	(2.931 ± 0.005)	$\bar{e}_L^- + \bar{e}_R^+$	0
$\bar{e}_R^- + \bar{e}_R^+$	(2.904 ± 0.005)	$\bar{d}_R + \bar{d}_L$	0
$\bar{\tau}_L^- + \bar{\tau}_L^+$	(2.837 ± 0.004)	$\bar{d}_L + \bar{d}_R$	0
$\bar{b}_L + \bar{b}_L$	(2.696 ± 0.006)	$\bar{c}_R + \bar{c}_L$	0
$\bar{C}_1^- + \bar{C}_2^+$	(1.773 ± 0.007)	$\bar{c}_L + \bar{c}_R$	0
$\bar{C}_1^+ + \bar{C}_2^-$	(1.772 ± 0.007)	$H^- + W^+$	0
$h + Z$	(1.363 ± 0.005)	$H^+ + W^-$	0
$\bar{\nu}_\tau + \bar{\nu}_\tau$	(1.327 ± 0.000)	$H + \gamma$	0
$\bar{\nu}_e + \bar{\nu}_e$	(1.326 ± 0.000)	$H + H$	0
$\bar{N}_2 + \bar{N}_4$	(1.318 ± 0.005)	$A + \gamma$	0
$H + A$	(1.215 ± 0.000)	$A + Z$	0
$\bar{s}_R + \bar{s}_R$	$(7.939 \pm 0.014) \times 10^{-1}$	$A + A$	0
$\bar{d}_R + \bar{d}_R$	$(7.939 \pm 0.014) \times 10^{-1}$		
$\bar{N}_2 + \bar{N}_3$	$(7.454 \pm 0.032) \times 10^{-1}$		
$\bar{b}_R + \bar{b}_R$	$(7.434 \pm 0.005) \times 10^{-1}$		

Table 3: Lowest order cross sections for three particle final states at $\sqrt{s} = 3.0$ TeV. Cone angle 10 degrees. All cross sections in femtobarns.

$\nu_\mu + \bar{\nu}_\mu + h$	$(4.986 \pm 0.018) \times 10^2$	$d + \bar{u}_L + \bar{C}_1^-$	(3.353 ± 0.010)	$W^- + \bar{C}_1^+ + \bar{N}_4$	(1.637 ± 0.011)
$\nu_\mu + \bar{\nu}_\mu + \bar{N}_1$	$(1.462 \pm 0.004) \times 10^2$	$\gamma + \bar{\mu}_R + \bar{\mu}_R^+$	(3.313 ± 0.006)	$u + \bar{u}_L + \bar{N}_2$	(1.616 ± 0.005)
$\bar{\nu}_\mu + \bar{\nu}_\mu + \bar{N}_1$	$(1.461 \pm 0.004) \times 10^2$	$u + \bar{u}_R + \bar{N}_1$	(3.179 ± 0.011)	$c + \bar{c}_L + \bar{N}_2$	(1.616 ± 0.005)
$\mu^- + \bar{\mu}_R^+ + \bar{N}_1$	$(4.657 \pm 0.016) \times 10^1$	$c + \bar{c}_R + \bar{N}_1$	(3.179 ± 0.011)	$\bar{u} + \bar{u}_L + \bar{N}_2$	(1.612 ± 0.005)
$\mu^+ + \bar{\mu}_R^- + \bar{N}_1$	$(4.647 \pm 0.016) \times 10^1$	$\gamma + \bar{C}_1^+ + \bar{C}_1^-$	(3.179 ± 0.007)	$\bar{c} + \bar{c}_L + \bar{N}_2$	(1.612 ± 0.005)
$\bar{\nu}_\mu + \bar{\nu}_\mu + \bar{N}_2$	$(3.915 \pm 0.015) \times 10^1$	$\bar{u} + \bar{u}_R + \bar{N}_1$	(3.177 ± 0.011)	$b + \bar{t}_R + \bar{C}_1^+$	(1.465 ± 0.004)
$\nu_\mu + \bar{\nu}_\mu + \bar{N}_2$	$(3.9 \pm 0.011) \times 10^1$	$\bar{c} + \bar{c}_R + \bar{N}_1$	(3.177 ± 0.011)	$\bar{b} + \bar{t}_R + \bar{C}_1^-$	(1.464 ± 0.004)
$\mu^- + \bar{\mu}_L^+ + \bar{N}_1$	$(2.565 \pm 0.007) \times 10^1$	$e^- + \bar{e}_R^+ + \bar{N}_1$	(3.117 ± 0.008)	$g + \bar{t}_R + \bar{t}_R$	(1.424 ± 0.004)
$\mu^+ + \bar{\mu}_L^- + \bar{N}_1$	$(2.554 \pm 0.007) \times 10^1$	$e^+ + \bar{e}_R^- + \bar{N}_1$	(3.109 ± 0.008)	$g + \bar{u}_R + \bar{u}_R$	(1.4 ± 0.006)
$\bar{\nu}_\mu + \bar{\mu}_L^- + \bar{C}_1^+$	$(2.51 \pm 0.009) \times 10^1$	$W^- + \bar{C}_1^+ + \bar{N}_1$	(3.059 ± 0.009)	$g + \bar{c}_R + \bar{c}_R$	(1.4 ± 0.006)
$\nu_\mu + \bar{\mu}_L^+ + \bar{C}_1^-$	$(2.509 \pm 0.006) \times 10^1$	$Z + \bar{C}_1^- + \bar{C}_2^+$	(3.052 ± 0.018)	$\bar{\nu}_\tau + \bar{\nu}_\tau + \bar{N}_1$	(1.359 ± 0.002)
$\bar{\nu}_\tau + \bar{\tau}_L^- + \bar{C}_1^+$	$(1.937 \pm 0.005) \times 10^1$	$Z + \bar{C}_1^+ + \bar{C}_2^-$	(3.051 ± 0.018)	$\nu_\tau + \bar{\nu}_\tau + \bar{N}_1$	(1.357 ± 0.002)
$\nu_\tau + \bar{\tau}_L^+ + \bar{C}_1^-$	$(1.936 \pm 0.006) \times 10^1$	$W^+ + \bar{C}_1^- + \bar{N}_1$	(3.05 ± 0.010)	$g + \bar{s}_L + \bar{s}_L$	(1.354 ± 0.004)
$\gamma + \bar{\nu}_\mu + \bar{\nu}_\mu$	$(1.457 \pm 0.004) \times 10^1$	$\bar{\nu}_\mu + \bar{\nu}_\mu + \bar{N}_3$	(2.959 ± 0.010)	$g + \bar{d}_L + \bar{d}_L$	(1.354 ± 0.004)
$Z + \bar{\nu}_\mu + \bar{\nu}_\mu$	$(1.283 \pm 0.004) \times 10^1$	$\gamma + \bar{\mu}_L^- + \bar{\mu}_L^+$	(2.948 ± 0.004)	$\bar{t} + \bar{b}_L + \bar{C}_1^+$	(1.354 ± 0.005)
$\mu^- + \bar{\nu}_\mu + \bar{C}_1^+$	$(1.119 \pm 0.003) \times 10^1$	$\nu_\mu + \bar{\nu}_\mu + \bar{N}_3$	(2.943 ± 0.007)	$\bar{\nu}_e + \bar{\nu}_e + \bar{N}_1$	(1.348 ± 0.002)
$\mu^+ + \bar{\nu}_\mu + \bar{C}_1^-$	$(1.114 \pm 0.003) \times 10^1$	$Z + \bar{C}_1^+ + \bar{C}_1^-$	(2.919 ± 0.019)	$t + \bar{b}_L + \bar{C}_1^-$	(1.346 ± 0.005)
$W^+ + \bar{\mu}_L^- + \bar{\nu}_\mu$	(9.385 ± 0.030)	$\bar{b} + \bar{t}_L + \bar{C}_1^-$	(2.474 ± 0.009)	$\nu_e + \bar{\nu}_e + \bar{N}_1$	(1.346 ± 0.002)
$W^- + \bar{\mu}_L^+ + \bar{\nu}_\mu$	(9.357 ± 0.041)	$b + \bar{t}_L + \bar{C}_1^+$	(2.473 ± 0.009)	$W^- + \bar{C}_1^+ + \bar{N}_3$	(1.288 ± 0.015)
$\mu^- + \bar{\mu}_L^+ + \bar{N}_2$	(7.704 ± 0.033)	$b + t + H^-$	(2.344 ± 0.007)	$W^+ + \bar{C}_1^- + \bar{N}_3$	(1.277 ± 0.011)
$\mu^+ + \bar{\mu}_L^- + \bar{N}_2$	(7.657 ± 0.026)	$b + \bar{t} + H^+$	(2.343 ± 0.008)	$g + \bar{b}_L + \bar{b}_L$	(1.268 ± 0.003)
$\tau^+ + \bar{\tau}_L^- + \bar{N}_2$	(7.487 ± 0.033)	$h + \bar{C}_1^- + \bar{C}_2^+$	(2.246 ± 0.010)	$h + W^+ + W^-$	(1.15 ± 0.004)
$\tau^- + \bar{\tau}_L^+ + \bar{N}_2$	(7.472 ± 0.033)	$h + \bar{C}_1^+ + \bar{C}_2^-$	(2.232 ± 0.010)	$\bar{\nu}_\mu + \bar{\mu}_R^- + \bar{C}_1^+$	(1.139 ± 0.002)
$\tau^+ + \bar{\tau}_L^- + \bar{N}_1$	(5.063 ± 0.017)	$\gamma + \bar{C}_2^+ + \bar{C}_2^-$	(2.061 ± 0.005)	$\nu_\mu + \bar{\mu}_R^+ + \bar{C}_1^-$	(1.139 ± 0.002)
$\tau^- + \bar{\tau}_L^+ + \bar{N}_1$	(5.048 ± 0.016)	$g + \bar{u}_L + \bar{u}_L$	(2.043 ± 0.005)	$W^+ + \bar{C}_2^- + \bar{N}_1$	(1.104 ± 0.016)
$W^+ + \bar{C}_1^- + \bar{N}_2$	(4.113 ± 0.020)	$g + \bar{c}_L + \bar{c}_L$	(2.043 ± 0.005)	$W^- + \bar{C}_2^+ + \bar{N}_1$	(1.085 ± 0.021)
$W^- + \bar{C}_1^+ + \bar{N}_2$	(4.105 ± 0.018)	$u + \bar{d}_L + \bar{C}_1^-$	(1.999 ± 0.006)	$\gamma + \bar{N}_2 + \bar{N}_2$	(1.059 ± 0.003)
$W^- + \bar{C}_2^+ + \bar{N}_2$	(4.031 ± 0.030)	$c + \bar{s}_L + \bar{C}_1^-$	(1.999 ± 0.006)	$\bar{b} + \bar{b}_L + \bar{N}_2$	(1.054 ± 0.004)
$W^+ + \bar{C}_2^- + \bar{N}_2$	(4.027 ± 0.031)	$\bar{u} + \bar{d}_L + \bar{C}_1^+$	(1.997 ± 0.006)	$b + \bar{b}_L + \bar{N}_2$	(1.053 ± 0.004)
$\nu_\mu + \bar{\nu}_\mu + \bar{N}_4$	(3.915 ± 0.009)	$\bar{c} + \bar{s}_L + \bar{C}_1^+$	(1.997 ± 0.006)	$\bar{s} + \bar{s}_L + \bar{N}_2$	(1.034 ± 0.003)
$\bar{\nu}_\mu + \bar{\nu}_\mu + \bar{N}_4$	(3.905 ± 0.009)	$\tau^- + \bar{\tau}_R^+ + \bar{N}_1$	(1.973 ± 0.006)	$d + \bar{d}_L + \bar{N}_2$	(1.034 ± 0.003)
$\bar{\nu}_\mu + \bar{\mu}_L^- + \bar{C}_2^+$	(3.782 ± 0.010)	$\tau^+ + \bar{\tau}_R^- + \bar{N}_1$	(1.967 ± 0.006)	$s + \bar{s}_L + \bar{N}_2$	(1.033 ± 0.003)
$\nu_\mu + \bar{\mu}_L^+ + \bar{C}_2^-$	(3.78 ± 0.010)	$g + \bar{t}_L + \bar{t}_L$	(1.929 ± 0.006)	$d + \bar{d}_L + \bar{N}_2$	(1.033 ± 0.003)
$s + \bar{c}_L + \bar{C}_1^+$	(3.354 ± 0.010)	$e^+ + \bar{e}_L^- + \bar{N}_1$	(1.861 ± 0.005)	$W^+ + \bar{C}_2^- + \bar{N}_3$	(1.028 ± 0.005)
$d + \bar{u}_L + \bar{C}_1^+$	(3.354 ± 0.010)	$e^- + \bar{e}_L^+ + \bar{N}_1$	(1.861 ± 0.005)	$\bar{\nu}_e + \bar{e}_L^- + \bar{C}_1^+$	(1.027 ± 0.004)
$\bar{s} + \bar{c}_L + \bar{C}_1^-$	(3.353 ± 0.010)	$\gamma + \bar{N}_1 + \bar{N}_1$	(1.749 ± 0.006)	$\nu_e + \bar{e}_L^+ + \bar{C}_1^-$	(1.025 ± 0.006)
		$W^+ + \bar{C}_1^- + \bar{N}_4$	(1.653 ± 0.013)	$W^- + \bar{C}_2^+ + \bar{N}_3$	(1.023 ± 0.005)
		$\bar{\nu}_\tau + \bar{\tau}_L^- + \bar{C}_2^+$	(1.641 ± 0.005)	$Z + \bar{N}_2 + \bar{N}_4$	(1.019 ± 0.005)
		$\nu_\tau + \bar{\tau}_L^+ + \bar{C}_2^-$	(1.64 ± 0.005)	$b + \bar{b} + A$	$(9.534 \pm 0.029) \times 10^{-1}$

$\bar{\nu}_\tau + \bar{\tau}_R^- + \bar{C}_1^+$	$(9.489 \pm 0.040) \times 10^{-1}$	$h + \bar{C}_1^+ + \bar{C}_1^-$	$(6.346 \pm 0.017) \times 10^{-1}$	$\gamma + \bar{u}_R + \bar{u}_R$	$(3.617 \pm 0.006) \times 10^{-1}$
$\nu_\tau + \bar{\tau}_R^+ + \bar{C}_1^-$	$(9.475 \pm 0.053) \times 10^{-1}$	$\gamma + \bar{\tau}_R^- + \bar{\tau}_R^+$	$(6.073 \pm 0.015) \times 10^{-1}$	$\gamma + \bar{c}_R + \bar{c}_R$	$(3.617 \pm 0.006) \times 10^{-1}$
$W^- + \bar{C}_2^+ + \bar{N}_4$	$(9.234 \pm 0.049) \times 10^{-1}$	$\gamma + \bar{N}_1 + \bar{N}_2$	$(6.056 \pm 0.012) \times 10^{-1}$	$g + \bar{t}_L + \bar{t}_R$	$(3.601 \pm 0.008) \times 10^{-1}$
$W^+ + \bar{C}_2^- + \bar{N}_4$	$(9.143 \pm 0.048) \times 10^{-1}$	$e^- + \bar{e}_L^+ + \bar{N}_2$	$(6.036 \pm 0.031) \times 10^{-1}$	$g + \bar{t}_R + \bar{t}_L$	$(3.581 \pm 0.009) \times 10^{-1}$
$\mu^+ + \bar{\mu}_R^- + \bar{N}_2$	$(8.732 \pm 0.021) \times 10^{-1}$	$e^+ + \bar{e}_L^- + \bar{N}_2$	$(6.011 \pm 0.036) \times 10^{-1}$	$Z + \bar{t}_L + \bar{t}_L$	$(3.525 \pm 0.007) \times 10^{-1}$
$\mu^- + \bar{\mu}_R^+ + \bar{N}_2$	$(8.726 \pm 0.018) \times 10^{-1}$	$\tau^+ + \bar{\tau}_L^- + \bar{N}_4$	$(5.922 \pm 0.034) \times 10^{-1}$	$g + \bar{s}_R + \bar{s}_R$	$(3.522 \pm 0.012) \times 10^{-1}$
$b + \bar{b} + H$	$(8.691 \pm 0.026) \times 10^{-1}$	$\tau^- + \bar{\tau}_L^+ + \bar{N}_4$	$(5.906 \pm 0.033) \times 10^{-1}$	$g + \bar{d}_R + \bar{d}_R$	$(3.522 \pm 0.012) \times 10^{-1}$
$\bar{s} + \bar{s}_R + \bar{N}_1$	$(7.951 \pm 0.028) \times 10^{-1}$	$W^+ + \bar{\tau}_R^- + \bar{\nu}_\tau$	$(5.88 \pm 0.019) \times 10^{-1}$	$\tau^- + \bar{\nu}_\tau + \bar{C}_2^+$	$(3.438 \pm 0.014) \times 10^{-1}$
$\bar{d} + \bar{d}_R + \bar{N}_1$	$(7.951 \pm 0.028) \times 10^{-1}$	$W^- + \bar{\tau}_R^+ + \bar{\nu}_\tau$	$(5.877 \pm 0.034) \times 10^{-1}$	$\tau^+ + \bar{\nu}_\tau + \bar{C}_2^-$	$(3.437 \pm 0.014) \times 10^{-1}$
$s + \bar{s}_R + \bar{N}_1$	$(7.928 \pm 0.028) \times 10^{-1}$	$\mu^- + \bar{\nu}_\mu + \bar{C}_2^+$	$(5.684 \pm 0.013) \times 10^{-1}$	$g + \bar{b}_R + \bar{b}_R$	$(3.316 \pm 0.010) \times 10^{-1}$
$\bar{d} + \bar{d}_R + \bar{N}_1$	$(7.928 \pm 0.028) \times 10^{-1}$	$\mu^+ + \bar{\nu}_\mu + \bar{C}_2^-$	$(5.684 \pm 0.013) \times 10^{-1}$	$\tau^- + \bar{\tau}_L^+ + \bar{N}_3$	$(3.305 \pm 0.015) \times 10^{-1}$
$W^+ + \bar{b}_L + \bar{t}_L$	$(7.49 \pm 0.030) \times 10^{-1}$	$\tau^+ + \bar{\tau}_R^- + \bar{N}_2$	$(5.639 \pm 0.034) \times 10^{-1}$	$\tau^+ + \bar{\tau}_L^- + \bar{N}_3$	$(3.298 \pm 0.015) \times 10^{-1}$
$H^- + \bar{C}_1^+ + \bar{N}_1$	$(7.459 \pm 0.028) \times 10^{-1}$	$\tau^- + \bar{\tau}_R^+ + \bar{N}_2$	$(5.628 \pm 0.039) \times 10^{-1}$	$h + \bar{N}_1 + \bar{N}_3$	$(3.185 \pm 0.011) \times 10^{-1}$
$b + \bar{t}_R + \bar{C}_2^+$	$(7.456 \pm 0.032) \times 10^{-1}$	$Z + \bar{N}_1 + \bar{N}_4$	$(5.41 \pm 0.030) \times 10^{-1}$	$\gamma + \bar{s}_L + \bar{s}_L$	$(3.175 \pm 0.007) \times 10^{-1}$
$\bar{b} + \bar{t}_R + \bar{C}_2^-$	$(7.452 \pm 0.032) \times 10^{-1}$	$\gamma + \bar{u}_L + \bar{u}_L$	$(5.367 \pm 0.009) \times 10^{-1}$	$\gamma + \bar{d}_L + \bar{d}_L$	$(3.175 \pm 0.007) \times 10^{-1}$
$W^- + \bar{b}_L + \bar{t}_L$	$(7.447 \pm 0.025) \times 10^{-1}$	$\gamma + \bar{c}_L + \bar{c}_L$	$(5.367 \pm 0.009) \times 10^{-1}$	$\gamma + \bar{C}_1^+ + \bar{C}_2^-$	$(3.013 \pm 0.007) \times 10^{-1}$
$H^+ + \bar{C}_1^- + \bar{N}_1$	$(7.428 \pm 0.047) \times 10^{-1}$	$\gamma + \bar{N}_3 + \bar{N}_4$	$(5.246 \pm 0.028) \times 10^{-1}$	$\gamma + \bar{C}_1^- + \bar{C}_2^+$	$(2.987 \pm 0.011) \times 10^{-1}$
$W^+ + \bar{u}_L + \bar{d}_L$	$(7.418 \pm 0.035) \times 10^{-1}$	$t + \bar{t}_L + \bar{N}_2$	$(5.245 \pm 0.025) \times 10^{-1}$	$\bar{t} + \bar{b}_R + \bar{C}_1^+$	$(2.973 \pm 0.007) \times 10^{-1}$
$W^+ + \bar{s}_L + \bar{c}_L$	$(7.408 \pm 0.035) \times 10^{-1}$	$\bar{t} + \bar{t}_L + \bar{N}_2$	$(5.244 \pm 0.017) \times 10^{-1}$	$t + \bar{b}_R + \bar{C}_1^-$	$(2.964 \pm 0.008) \times 10^{-1}$
$W^- + \bar{u}_L + \bar{d}_L$	$(7.36 \pm 0.034) \times 10^{-1}$	$e^- + \bar{e}_R^+ + \bar{N}_2$	$(5.219 \pm 0.016) \times 10^{-1}$	$\bar{t} + \bar{t}_R + \bar{N}_1$	$(2.819 \pm 0.006) \times 10^{-1}$
$\bar{t} + \bar{t}_L + \bar{N}_1$	$(7.348 \pm 0.047) \times 10^{-1}$	$e^+ + \bar{e}_R^- + \bar{N}_2$	$(5.187 \pm 0.016) \times 10^{-1}$	$W^+ + \bar{b}_R + \bar{t}_L$	$(2.819 \pm 0.006) \times 10^{-1}$
$W^- + \bar{s}_L + \bar{c}_L$	$(7.342 \pm 0.041) \times 10^{-1}$	$Z + \bar{C}_2^+ + \bar{C}_2^-$	$(5.151 \pm 0.024) \times 10^{-1}$	$t + \bar{t}_R + \bar{N}_1$	$(2.817 \pm 0.007) \times 10^{-1}$
$t + \bar{t}_L + \bar{N}_1$	$(7.334 \pm 0.023) \times 10^{-1}$	$W^+ + \bar{b}_L + \bar{t}_R$	$(5.013 \pm 0.022) \times 10^{-1}$	$W^- + \bar{b}_R + \bar{t}_L$	$(2.806 \pm 0.008) \times 10^{-1}$
$t + \bar{t}_R + \bar{N}_4$	$(7.238 \pm 0.022) \times 10^{-1}$	$Z + \bar{N}_1 + \bar{N}_1$	$(5.002 \pm 0.023) \times 10^{-1}$	$\gamma + \bar{b}_L + \bar{b}_L$	$(2.752 \pm 0.008) \times 10^{-1}$
$\bar{t} + \bar{t}_R + \bar{N}_4$	$(7.228 \pm 0.022) \times 10^{-1}$	$W^- + \bar{b}_L + \bar{t}_R$	$(4.996 \pm 0.022) \times 10^{-1}$	$e^- + \bar{\nu}_e + \bar{C}_2^+$	$(2.528 \pm 0.009) \times 10^{-1}$
$\bar{\nu}_\tau + \bar{\tau}_R^- + \bar{C}_2^+$	$(7.171 \pm 0.027) \times 10^{-1}$	$\mu^- + \mu^+ + h$	$(4.918 \pm 0.021) \times 10^{-1}$	$e^+ + \bar{\nu}_e + \bar{C}_2^-$	$(2.527 \pm 0.012) \times 10^{-1}$
$\nu_\tau + \bar{\tau}_R^+ + \bar{C}_2^-$	$(7.163 \pm 0.026) \times 10^{-1}$	$Z + \bar{N}_2 + \bar{N}_2$	$(4.872 \pm 0.016) \times 10^{-1}$	$\bar{b} + \bar{b}_R + \bar{N}_1$	$(2.43 \pm 0.011) \times 10^{-1}$
$Z + \bar{t}_L + \bar{t}_R$	$(6.983 \pm 0.023) \times 10^{-1}$	$H + \bar{C}_1^+ + \bar{C}_1^-$	$(4.657 \pm 0.010) \times 10^{-1}$	$b + \bar{b}_R + \bar{N}_1$	$(2.429 \pm 0.011) \times 10^{-1}$
$Z + \bar{t}_R + \bar{t}_L$	$(6.933 \pm 0.025) \times 10^{-1}$	$H^+ + H^- + \gamma$	$(4.608 \pm 0.009) \times 10^{-1}$	$\tau^+ + \bar{\nu}_\tau + \bar{C}_1^-$	$(2.415 \pm 0.007) \times 10^{-1}$
$Z + \bar{\mu}_L^- + \bar{\mu}_L^+$	$(6.84 \pm 0.026) \times 10^{-1}$	$\bar{t} + \bar{t}_R + \bar{N}_2$	$(4.585 \pm 0.020) \times 10^{-1}$	$\tau^- + \bar{\nu}_\tau + \bar{C}_1^+$	$(2.403 \pm 0.012) \times 10^{-1}$
$Z + \bar{\mu}_R^- + \bar{\mu}_R^+$	$(6.758 \pm 0.014) \times 10^{-1}$	$t + \bar{t}_R + \bar{N}_2$	$(4.58 \pm 0.013) \times 10^{-1}$	$\bar{b} + \bar{b}_L + \bar{N}_1$	$(2.377 \pm 0.006) \times 10^{-1}$
$h + \bar{N}_2 + \bar{N}_3$	$(6.641 \pm 0.026) \times 10^{-1}$	$\tau^- + \bar{\nu}_\tau + H^+$	$(4.373 \pm 0.016) \times 10^{-1}$	$b + \bar{b}_L + \bar{N}_1$	$(2.376 \pm 0.006) \times 10^{-1}$
$\nu_e + \bar{e}_L^+ + \bar{C}_2^-$	$(6.626 \pm 0.024) \times 10^{-1}$	$\tau^+ + \nu_\tau + H^-$	$(4.37 \pm 0.016) \times 10^{-1}$	$\bar{b} + \bar{b}_R + \bar{N}_2$	$(2.376 \pm 0.007) \times 10^{-1}$
$\bar{\nu}_e + \bar{e}_L^- + \bar{C}_2^+$	$(6.595 \pm 0.026) \times 10^{-1}$	$\gamma + \bar{t}_L + \bar{t}_L$	$(4.247 \pm 0.004) \times 10^{-1}$	$b + \bar{b}_R + \bar{N}_2$	$(2.369 \pm 0.007) \times 10^{-1}$
$W^+ + \bar{e}_L^- + \bar{\nu}_e$	$(6.431 \pm 0.021) \times 10^{-1}$	$\gamma + \bar{t}_R + \bar{t}_R$	$(3.859 \pm 0.005) \times 10^{-1}$	$e^+ + \bar{\nu}_e + \bar{C}_1^-$	$(2.365 \pm 0.015) \times 10^{-1}$
$W^- + \bar{e}_L^+ + \bar{\nu}_e$	$(6.399 \pm 0.038) \times 10^{-1}$	$b + \bar{t}_L + \bar{C}_2^+$	$(3.79 \pm 0.011) \times 10^{-1}$	$e^- + \bar{\nu}_e + \bar{C}_1^+$	$(2.337 \pm 0.013) \times 10^{-1}$
$\gamma + \bar{e}_R^- + \bar{e}_R^+$	$(6.392 \pm 0.017) \times 10^{-1}$	$\bar{b} + \bar{t}_L + \bar{C}_2^-$	$(3.787 \pm 0.010) \times 10^{-1}$	$\bar{\nu}_\mu + \bar{\mu}_R^- + \bar{C}_2^+$	$(2.196 \pm 0.004) \times 10^{-1}$
$\gamma + \bar{\tau}_L^- + \bar{\tau}_L^+$	$(6.352 \pm 0.017) \times 10^{-1}$	$Z + \bar{N}_1 + \bar{N}_2$	$(3.776 \pm 0.011) \times 10^{-1}$	$\nu_\mu + \bar{\mu}_R^+ + \bar{C}_2^-$	$(2.187 \pm 0.003) \times 10^{-1}$
$\gamma + \bar{e}_L^- + \bar{e}_L^+$	$(6.35 \pm 0.014) \times 10^{-1}$	$t + \bar{t} + h$	$(3.729 \pm 0.010) \times 10^{-1}$		

$h + \tilde{N}_1 + \tilde{N}_2$	$(2.105 \pm 0.004) \times 10^{-1}$	$Z + \tilde{N}_3 + \tilde{N}_4$	$(1.287 \pm 0.008) \times 10^{-1}$	$\gamma + \tilde{N}_2 + \tilde{N}_3$	$(8.777 \pm 0.081) \times 10^{-2}$
$h + \gamma + Z$	$(2.092 \pm 0.008) \times 10^{-1}$	$Z + \tilde{\tau}_R^- + \tilde{\tau}_R^+$	$(1.286 \pm 0.004) \times 10^{-1}$	$b + \tilde{b}_L + \tilde{g}$	$(8.709 \pm 0.035) \times 10^{-2}$
$h + \tilde{N}_2 + \tilde{N}_2$	$(2.038 \pm 0.007) \times 10^{-1}$	$Z + \tilde{N}_2 + \tilde{N}_3$	$(1.276 \pm 0.015) \times 10^{-1}$	$\tilde{b} + \tilde{b}_L + \tilde{g}$	$(8.708 \pm 0.034) \times 10^{-2}$
$b + \tilde{b} + h$	$(2.033 \pm 0.011) \times 10^{-1}$	$Z + \tilde{e}_R^- + \tilde{e}_R^+$	$(1.24 \pm 0.003) \times 10^{-1}$	$\gamma + \tilde{t}_L + \tilde{t}_R$	$(8.632 \pm 0.037) \times 10^{-2}$
$H + \tilde{N}_1 + \tilde{N}_2$	$(2.014 \pm 0.002) \times 10^{-1}$	$Z + \tilde{N}_1 + \tilde{N}_3$	$(1.224 \pm 0.010) \times 10^{-1}$	$h + \tilde{N}_2 + \tilde{N}_4$	$(8.612 \pm 0.021) \times 10^{-2}$
$A + H^+ + W^-$	$(1.952 \pm 0.009) \times 10^{-1}$	$Z + \tilde{\tau}_L^- + \tilde{\tau}_L^+$	$(1.185 \pm 0.003) \times 10^{-1}$	$\gamma + \tilde{t}_R + \tilde{t}_L$	$(8.612 \pm 0.033) \times 10^{-2}$
$H + H^- + W^+$	$(1.946 \pm 0.010) \times 10^{-1}$	$h + \tilde{N}_1 + \tilde{N}_4$	$(1.178 \pm 0.007) \times 10^{-1}$	$\nu_e + \tilde{\nu}_e + \tilde{N}_2$	$(8.565 \pm 0.023) \times 10^{-2}$
$H + H^+ + W^-$	$(1.937 \pm 0.009) \times 10^{-1}$	$H + A + \gamma$	$(1.178 \pm 0.007) \times 10^{-1}$	$\tilde{\nu}_e + \tilde{\nu}_e + \tilde{N}_2$	$(8.563 \pm 0.019) \times 10^{-2}$
$A + H^- + W^+$	$(1.933 \pm 0.009) \times 10^{-1}$	$\nu_\tau + \tilde{\nu}_\tau + \tilde{N}_3$	$(1.147 \pm 0.006) \times 10^{-1}$	$A + \tilde{C}_1^+ + \tilde{C}_1^-$	$(8.449 \pm 0.018) \times 10^{-2}$
$t + \tilde{t}_R + \tilde{N}_3$	$(1.907 \pm 0.007) \times 10^{-1}$	$\tilde{\nu}_\tau + \tilde{\nu}_\tau + \tilde{N}_3$	$(1.144 \pm 0.003) \times 10^{-1}$	$h + Z + Z$	$(8.387 \pm 0.052) \times 10^{-2}$
$\tilde{t} + \tilde{t}_R + \tilde{N}_3$	$(1.896 \pm 0.007) \times 10^{-1}$	$\nu_e + \tilde{\nu}_e + \tilde{N}_3$	$(1.14 \pm 0.006) \times 10^{-1}$	$Z + \tilde{t}_R + \tilde{t}_R$	$(8.36 \pm 0.046) \times 10^{-2}$
$t + \tilde{t} + H$	$(1.853 \pm 0.003) \times 10^{-1}$	$\tilde{\nu}_e + \tilde{\nu}_e + \tilde{N}_3$	$(1.139 \pm 0.003) \times 10^{-1}$	$H^- + \tilde{\tau}_L^+ + \tilde{\nu}_\tau$	$(8.352 \pm 0.015) \times 10^{-2}$
$t + \tilde{t}_L + \tilde{N}_4$	$(1.769 \pm 0.003) \times 10^{-1}$	$Z + \tilde{s}_L + \tilde{s}_L$	$(1.112 \pm 0.003) \times 10^{-1}$	$H^+ + \tilde{\tau}_L^- + \tilde{\nu}_\tau$	$(8.352 \pm 0.015) \times 10^{-2}$
$\tilde{t} + \tilde{t}_L + \tilde{N}_4$	$(1.768 \pm 0.003) \times 10^{-1}$	$Z + \tilde{d}_L + \tilde{d}_L$	$(1.112 \pm 0.003) \times 10^{-1}$	$\tilde{\nu}_\tau + \tilde{\nu}_\tau + \tilde{N}_2$	$(8.347 \pm 0.026) \times 10^{-2}$
$H + \tilde{N}_2 + \tilde{N}_2$	$(1.744 \pm 0.004) \times 10^{-1}$	$t + \tilde{t}_L + \tilde{N}_3$	$(1.079 \pm 0.002) \times 10^{-1}$	$\nu_\tau + \tilde{\nu}_\tau + \tilde{N}_2$	$(8.322 \pm 0.038) \times 10^{-2}$
$\tau^- + \tau^+ + A$	$(1.681 \pm 0.005) \times 10^{-1}$	$\tilde{t} + \tilde{t}_L + \tilde{N}_3$	$(1.079 \pm 0.002) \times 10^{-1}$	$\gamma + \tilde{N}_1 + \tilde{N}_4$	$(8.166 \pm 0.011) \times 10^{-2}$
$g + \tilde{b}_R + \tilde{b}_L$	$(1.6 \pm 0.003) \times 10^{-1}$	$t + \tilde{t}_L + \tilde{g}$	$(1.042 \pm 0.004) \times 10^{-1}$	$\gamma + \tilde{s}_R + \tilde{s}_R$	$(8.021 \pm 0.009) \times 10^{-2}$
$g + \tilde{b}_L + \tilde{b}_R$	$(1.599 \pm 0.003) \times 10^{-1}$	$\tilde{t} + \tilde{t}_L + \tilde{g}$	$(1.04 \pm 0.003) \times 10^{-1}$	$\gamma + \tilde{d}_R + \tilde{d}_R$	$(8.021 \pm 0.009) \times 10^{-2}$
$u + \tilde{d}_L + \tilde{C}_2^-$	$(1.536 \pm 0.004) \times 10^{-1}$	$\tilde{t} + \tilde{t}_R + \tilde{g}$	$(1.021 \pm 0.003) \times 10^{-1}$	$Z + \tilde{N}_3 + \tilde{N}_3$	$(7.993 \pm 0.113) \times 10^{-2}$
$c + \tilde{s}_L + \tilde{C}_2^-$	$(1.536 \pm 0.004) \times 10^{-1}$	$t + \tilde{t}_R + \tilde{g}$	$(1.018 \pm 0.004) \times 10^{-1}$	$\tilde{s} + \tilde{c}_L + \tilde{C}_2^-$	$(7.834 \pm 0.020) \times 10^{-2}$
$\tilde{u} + \tilde{d}_L + \tilde{C}_2^+$	$(1.536 \pm 0.004) \times 10^{-1}$	$Z + \tilde{b}_L + \tilde{b}_L$	$(1.011 \pm 0.004) \times 10^{-1}$	$\tilde{d} + \tilde{u}_L + \tilde{C}_2^-$	$(7.834 \pm 0.020) \times 10^{-2}$
$\tilde{c} + \tilde{s}_L + \tilde{C}_2^+$	$(1.536 \pm 0.004) \times 10^{-1}$	$s + \tilde{s}_L + \tilde{g}$	$(9.881 \pm 0.027) \times 10^{-2}$	$s + \tilde{c}_L + \tilde{C}_2^+$	$(7.809 \pm 0.022) \times 10^{-2}$
$\gamma + \tilde{N}_2 + \tilde{N}_4$	$(1.533 \pm 0.003) \times 10^{-1}$	$d + \tilde{d}_L + \tilde{g}$	$(9.881 \pm 0.027) \times 10^{-2}$	$d + \tilde{u}_L + \tilde{C}_2^+$	$(7.809 \pm 0.022) \times 10^{-2}$
$\tau^- + \tau^+ + H$	$(1.532 \pm 0.004) \times 10^{-1}$	$\tilde{s} + \tilde{s}_L + \tilde{g}$	$(9.855 \pm 0.029) \times 10^{-2}$	$\gamma + \tilde{b}_R + \tilde{b}_R$	$(7.529 \pm 0.012) \times 10^{-2}$
$t + \tilde{b}_L + \tilde{C}_2^-$	$(1.525 \pm 0.005) \times 10^{-1}$	$\tilde{d} + \tilde{d}_L + \tilde{g}$	$(9.855 \pm 0.029) \times 10^{-2}$	$\tau^- + \tilde{\tau}_R^+ + \tilde{N}_3$	$(7.178 \pm 0.044) \times 10^{-2}$
$\tilde{t} + \tilde{b}_L + \tilde{C}_2^+$	$(1.524 \pm 0.005) \times 10^{-1}$	$A + \tilde{N}_1 + \tilde{N}_2$	$(9.837 \pm 0.022) \times 10^{-2}$	$\tau^+ + \tilde{\tau}_R^- + \tilde{N}_3$	$(7.142 \pm 0.027) \times 10^{-2}$
$\gamma + \tilde{\nu}_\tau + \tilde{\nu}_\tau$	$(1.508 \pm 0.007) \times 10^{-1}$	$Z + \tilde{\nu}_\tau + \tilde{\nu}_\tau$	$(9.724 \pm 0.035) \times 10^{-2}$	$\mu^+ + \tilde{\mu}_R^- + \tilde{N}_4$	$(6.987 \pm 0.015) \times 10^{-2}$
$\gamma + \tilde{\nu}_e + \tilde{\nu}_e$	$(1.5 \pm 0.007) \times 10^{-1}$	$Z + \tilde{\nu}_e + \tilde{\nu}_e$	$(9.686 \pm 0.032) \times 10^{-2}$	$\mu^- + \tilde{\mu}_R^+ + \tilde{N}_4$	$(6.985 \pm 0.014) \times 10^{-2}$
$W^- + \tilde{\mu}_R^+ + \tilde{\nu}_\mu$	$(1.493 \pm 0.002) \times 10^{-1}$	$u + \tilde{u}_R + \tilde{g}$	$(9.433 \pm 0.030) \times 10^{-2}$	$\gamma + \tilde{\mu}_L^- + \tilde{\mu}_R^+$	$(6.667 \pm 0.007) \times 10^{-2}$
$W^+ + \tilde{\mu}_R^- + \tilde{\nu}_\mu$	$(1.492 \pm 0.002) \times 10^{-1}$	$c + \tilde{c}_R + \tilde{g}$	$(9.433 \pm 0.030) \times 10^{-2}$	$\gamma + \tilde{\mu}_R^- + \tilde{\mu}_L^+$	$(6.659 \pm 0.018) \times 10^{-2}$
$\tilde{u} + \tilde{u}_L + \tilde{g}$	$(1.447 \pm 0.004) \times 10^{-1}$	$\tilde{u} + \tilde{u}_R + \tilde{g}$	$(9.4 \pm 0.030) \times 10^{-2}$	$W^+ + \tilde{b}_R + \tilde{t}_R$	$(6.199 \pm 0.027) \times 10^{-2}$
$\tilde{c} + \tilde{c}_L + \tilde{g}$	$(1.447 \pm 0.004) \times 10^{-1}$	$\tilde{c} + \tilde{c}_R + \tilde{g}$	$(9.4 \pm 0.030) \times 10^{-2}$	$W^- + \tilde{b}_R + \tilde{t}_R$	$(6.144 \pm 0.026) \times 10^{-2}$
$u + \tilde{u}_L + \tilde{g}$	$(1.445 \pm 0.004) \times 10^{-1}$	$\nu_\tau + \tilde{\nu}_\tau + h$	$(9.313 \pm 0.015) \times 10^{-2}$	$b + \tilde{b}_R + \tilde{N}_4$	$(6.035 \pm 0.020) \times 10^{-2}$
$c + \tilde{c}_L + \tilde{g}$	$(1.445 \pm 0.004) \times 10^{-1}$	$\nu_e + \tilde{\nu}_e + h$	$(9.313 \pm 0.015) \times 10^{-2}$	$t + \tilde{t} + A$	$(6.016 \pm 0.013) \times 10^{-2}$
$Z + \tilde{e}_L^- + \tilde{e}_L^+$	$(1.439 \pm 0.006) \times 10^{-1}$	$H^+ + H^- + Z$	$(9.283 \pm 0.040) \times 10^{-2}$	$\tilde{b} + \tilde{b}_R + \tilde{N}_4$	$(6.009 \pm 0.020) \times 10^{-2}$
$Z + \tilde{u}_L + \tilde{u}_L$	$(1.421 \pm 0.005) \times 10^{-1}$	$s + \tilde{s}_L + \tilde{N}_1$	$(9.228 \pm 0.029) \times 10^{-2}$	$Z + \tilde{N}_4 + \tilde{N}_4$	$(5.927 \pm 0.079) \times 10^{-2}$
$Z + \tilde{c}_L + \tilde{c}_L$	$(1.421 \pm 0.005) \times 10^{-1}$	$d + \tilde{d}_L + \tilde{N}_1$	$(9.228 \pm 0.029) \times 10^{-2}$	$Z + \tilde{u}_R + \tilde{u}_R$	$(5.844 \pm 0.028) \times 10^{-2}$
$h + \tilde{t}_L + \tilde{t}_R$	$(1.303 \pm 0.002) \times 10^{-1}$	$\tilde{s} + \tilde{s}_L + \tilde{N}_1$	$(9.224 \pm 0.029) \times 10^{-2}$	$Z + \tilde{c}_R + \tilde{c}_R$	$(5.844 \pm 0.028) \times 10^{-2}$
$h + \tilde{t}_R + \tilde{t}_L$	$(1.302 \pm 0.002) \times 10^{-1}$	$\tilde{d} + \tilde{d}_L + \tilde{N}_1$	$(9.224 \pm 0.029) \times 10^{-2}$		

$b + \bar{b}_L + \bar{N}_4$	$(5.833 \pm 0.012) \times 10^{-2}$	$\bar{c} + \bar{c}_R + \bar{N}_2$	$(3.777 \pm 0.009) \times 10^{-2}$	$H^+ + \bar{C}_1^- + \bar{N}_3$	$(1.828 \pm 0.005) \times 10^{-2}$
$\bar{b} + \bar{b}_L + \bar{N}_4$	$(5.827 \pm 0.012) \times 10^{-2}$	$e^- + \bar{e}_R^+ + \bar{N}_3$	$(3.776 \pm 0.008) \times 10^{-2}$	$A + A + Z$	$(1.745 \pm 0.013) \times 10^{-2}$
$W^- + \bar{\tau}_L^+ + \bar{\nu}_\tau$	$(5.642 \pm 0.037) \times 10^{-2}$	$u + \bar{u}_R + \bar{N}_2$	$(3.77 \pm 0.009) \times 10^{-2}$	$H^+ + \bar{C}_1^- + \bar{N}_2$	$(1.744 \pm 0.006) \times 10^{-2}$
$W^+ + \bar{\tau}_L^- + \bar{\nu}_\tau$	$(5.636 \pm 0.018) \times 10^{-2}$	$c + \bar{c}_R + \bar{N}_2$	$(3.77 \pm 0.009) \times 10^{-2}$	$H^- + \bar{C}_1^+ + \bar{N}_2$	$(1.744 \pm 0.004) \times 10^{-2}$
$h + \bar{t}_L + \bar{t}_L$	$(5.617 \pm 0.005) \times 10^{-2}$	$\nu_\mu + \bar{\nu}_\mu + H$	$(3.7 \pm 0.012) \times 10^{-2}$	$H + H + Z$	$(1.741 \pm 0.013) \times 10^{-2}$
$\bar{u} + \bar{u}_L + \bar{N}_1$	$(5.596 \pm 0.025) \times 10^{-2}$	$\gamma + \bar{N}_1 + \bar{N}_3$	$(3.629 \pm 0.010) \times 10^{-2}$	$H^- + \bar{C}_1^+ + \bar{N}_4$	$(1.561 \pm 0.005) \times 10^{-2}$
$\bar{c} + \bar{c}_L + \bar{N}_1$	$(5.596 \pm 0.025) \times 10^{-2}$	$\tau^- + \bar{\tau}_R^+ + \bar{N}_4$	$(3.579 \pm 0.014) \times 10^{-2}$	$H^+ + \bar{C}_1^- + \bar{N}_4$	$(1.56 \pm 0.004) \times 10^{-2}$
$u + \bar{u}_L + \bar{N}_1$	$(5.591 \pm 0.023) \times 10^{-2}$	$\tau^+ + \bar{\tau}_R^- + \bar{N}_4$	$(3.573 \pm 0.011) \times 10^{-2}$	$Z + \bar{b}_R + \bar{b}_R$	$(1.39 \pm 0.009) \times 10^{-2}$
$c + \bar{c}_L + \bar{N}_1$	$(5.591 \pm 0.023) \times 10^{-2}$	$\gamma + \bar{b}_L + \bar{b}_R$	$(3.528 \pm 0.006) \times 10^{-2}$	$\bar{u} + \bar{u}_R + \bar{N}_4$	$(1.377 \pm 0.004) \times 10^{-2}$
$u + \bar{u}_L + \bar{N}_4$	$(5.539 \pm 0.014) \times 10^{-2}$	$\gamma + \bar{b}_R + \bar{b}_L$	$(3.517 \pm 0.008) \times 10^{-2}$	$\bar{c} + \bar{c}_R + \bar{N}_4$	$(1.377 \pm 0.004) \times 10^{-2}$
$c + \bar{c}_L + \bar{N}_4$	$(5.539 \pm 0.014) \times 10^{-2}$	$H^+ + \bar{C}_2^- + \bar{N}_2$	$(3.477 \pm 0.017) \times 10^{-2}$	$u + \bar{u}_R + \bar{N}_4$	$(1.375 \pm 0.003) \times 10^{-2}$
$\bar{u} + \bar{u}_L + \bar{N}_4$	$(5.515 \pm 0.014) \times 10^{-2}$	$H^- + \bar{C}_2^+ + \bar{N}_2$	$(3.442 \pm 0.019) \times 10^{-2}$	$c + \bar{c}_R + \bar{N}_4$	$(1.375 \pm 0.003) \times 10^{-2}$
$\bar{c} + \bar{c}_L + \bar{N}_4$	$(5.515 \pm 0.014) \times 10^{-2}$	$b + \bar{b}_L + \bar{N}_3$	$(3.356 \pm 0.009) \times 10^{-2}$	$Z + \bar{s}_R + \bar{s}_R$	$(1.333 \pm 0.009) \times 10^{-2}$
$\mu^+ + \bar{\mu}_R^- + \bar{N}_3$	$(5.452 \pm 0.013) \times 10^{-2}$	$\bar{b} + \bar{b}_L + \bar{N}_3$	$(3.354 \pm 0.008) \times 10^{-2}$	$Z + \bar{d}_R + \bar{d}_R$	$(1.333 \pm 0.009) \times 10^{-2}$
$\mu^- + \bar{\mu}_R^+ + \bar{N}_3$	$(5.451 \pm 0.013) \times 10^{-2}$	$A + \bar{N}_1 + \bar{N}_1$	$(3.318 \pm 0.008) \times 10^{-2}$	$Z + \bar{b}_R + \bar{b}_L$	$(1.264 \pm 0.004) \times 10^{-2}$
$\mu^- + \bar{\mu}_L^+ + \bar{N}_4$	$(5.444 \pm 0.016) \times 10^{-2}$	$h + h + Z$	$(3.186 \pm 0.023) \times 10^{-2}$	$Z + \bar{b}_L + \bar{b}_R$	$(1.258 \pm 0.005) \times 10^{-2}$
$\mu^+ + \bar{\mu}_L^- + \bar{N}_4$	$(5.422 \pm 0.014) \times 10^{-2}$	$b + \bar{b}_R + \bar{g}$	$(3.145 \pm 0.010) \times 10^{-2}$	$Z + \bar{\tau}_R^- + \bar{\tau}_L^+$	$(1.221 \pm 0.005) \times 10^{-2}$
$\mu^- + \bar{\mu}_L^+ + \bar{N}_3$	$(5.358 \pm 0.017) \times 10^{-2}$	$\bar{b} + \bar{b}_R + \bar{g}$	$(3.144 \pm 0.010) \times 10^{-2}$	$Z + \bar{\tau}_L^- + \bar{\tau}_R^+$	$(1.214 \pm 0.006) \times 10^{-2}$
$\mu^+ + \bar{\mu}_L^- + \bar{N}_3$	$(5.354 \pm 0.016) \times 10^{-2}$	$A + \bar{N}_2 + \bar{N}_2$	$(2.772 \pm 0.005) \times 10^{-2}$	$H + \bar{N}_2 + \bar{N}_3$	$(1.16 \pm 0.004) \times 10^{-2}$
$h + \bar{N}_1 + \bar{N}_1$	$(5.272 \pm 0.012) \times 10^{-2}$	$h + \bar{t}_R + \bar{t}_R$	$(2.723 \pm 0.003) \times 10^{-2}$	$H + \bar{\tau}_R^- + \bar{\tau}_L^+$	$(1.139 \pm 0.000) \times 10^{-2}$
$\bar{s} + \bar{s}_L + \bar{N}_4$	$(5.034 \pm 0.014) \times 10^{-2}$	$H + A + Z$	$(2.706 \pm 0.027) \times 10^{-2}$	$H + \bar{\tau}_L^- + \bar{\tau}_R^+$	$(1.139 \pm 0.000) \times 10^{-2}$
$\bar{d} + \bar{d}_L + \bar{N}_4$	$(5.034 \pm 0.014) \times 10^{-2}$	$h + \bar{C}_2^+ + \bar{C}_2^-$	$(2.689 \pm 0.008) \times 10^{-2}$	$A + \bar{N}_2 + \bar{N}_4$	$(1.129 \pm 0.003) \times 10^{-2}$
$s + \bar{s}_L + \bar{N}_4$	$(5.005 \pm 0.014) \times 10^{-2}$	$t + \bar{b}_R + \bar{C}_2^-$	$(2.491 \pm 0.007) \times 10^{-2}$	$A + \bar{\nu}_\mu + \bar{\nu}_\mu$	$(1.116 \pm 0.002) \times 10^{-2}$
$d + \bar{d}_L + \bar{N}_4$	$(5.005 \pm 0.014) \times 10^{-2}$	$\bar{t} + \bar{b}_R + \bar{C}_2^+$	$(2.491 \pm 0.007) \times 10^{-2}$	$H + \bar{N}_1 + \bar{N}_3$	$(1.111 \pm 0.003) \times 10^{-2}$
$Z + \bar{\mu}_L^- + \bar{\mu}_R^+$	$(4.749 \pm 0.007) \times 10^{-2}$	$\bar{s} + \bar{s}_R + \bar{g}$	$(2.351 \pm 0.007) \times 10^{-2}$	$h + H^- + W^+$	$(1.097 \pm 0.006) \times 10^{-2}$
$Z + \bar{\mu}_R^- + \bar{\mu}_L^+$	$(4.741 \pm 0.019) \times 10^{-2}$	$\bar{d} + \bar{d}_R + \bar{g}$	$(2.351 \pm 0.007) \times 10^{-2}$	$h + H^+ + W^-$	$(1.093 \pm 0.006) \times 10^{-2}$
$A + \bar{C}_1^- + \bar{C}_2^+$	$(4.656 \pm 0.025) \times 10^{-2}$	$s + \bar{s}_R + \bar{g}$	$(2.345 \pm 0.012) \times 10^{-2}$	$A + \bar{\tau}_L^- + \bar{\tau}_L^+$	$(9.875 \pm 0.008) \times 10^{-3}$
$A + \bar{C}_1^+ + \bar{C}_2^-$	$(4.636 \pm 0.025) \times 10^{-2}$	$d + \bar{d}_R + \bar{g}$	$(2.345 \pm 0.012) \times 10^{-2}$	$A + \bar{N}_1 + \bar{N}_4$	$(9.715 \pm 0.029) \times 10^{-3}$
$H + \bar{N}_1 + \bar{N}_1$	$(4.599 \pm 0.007) \times 10^{-2}$	$H^+ + \bar{C}_2^- + \bar{N}_1$	$(2.116 \pm 0.007) \times 10^{-2}$	$s + \bar{s}_R + \bar{N}_2$	$(9.489 \pm 0.024) \times 10^{-3}$
$e^- + \bar{e}_R^+ + \bar{N}_4$	$(4.557 \pm 0.012) \times 10^{-2}$	$H^- + \bar{C}_2^+ + \bar{N}_1$	$(2.115 \pm 0.007) \times 10^{-2}$	$d + \bar{d}_R + \bar{N}_2$	$(9.489 \pm 0.024) \times 10^{-3}$
$e^+ + \bar{e}_R^- + \bar{N}_4$	$(4.555 \pm 0.012) \times 10^{-2}$	$h + h + A$	$(2.103 \pm 0.001) \times 10^{-2}$	$\bar{s} + \bar{s}_R + \bar{N}_2$	$(9.475 \pm 0.031) \times 10^{-3}$
$H + \bar{C}_1^- + \bar{C}_2^+$	$(4.283 \pm 0.024) \times 10^{-2}$	$\gamma + \bar{\tau}_R^- + \bar{\tau}_L^+$	$(2.053 \pm 0.007) \times 10^{-2}$	$\bar{d} + \bar{d}_R + \bar{N}_2$	$(9.475 \pm 0.031) \times 10^{-3}$
$H + \bar{C}_1^+ + \bar{C}_2^-$	$(4.277 \pm 0.024) \times 10^{-2}$	$\nu_\tau + \bar{\nu}_\tau + \bar{N}_4$	$(2.041 \pm 0.004) \times 10^{-2}$	$A + \bar{N}_2 + \bar{N}_3$	$(9.392 \pm 0.033) \times 10^{-3}$
$e^+ + \bar{e}_L^- + \bar{N}_3$	$(4.238 \pm 0.014) \times 10^{-2}$	$\bar{\nu}_\tau + \bar{\nu}_\tau + \bar{N}_4$	$(2.037 \pm 0.007) \times 10^{-2}$	$H + \bar{\nu}_\mu + \bar{\nu}_\mu$	$(9.082 \pm 0.033) \times 10^{-3}$
$e^- + \bar{e}_L^+ + \bar{N}_3$	$(4.232 \pm 0.017) \times 10^{-2}$	$\bar{\nu}_e + \bar{\nu}_e + \bar{N}_4$	$(2.033 \pm 0.008) \times 10^{-2}$	$A + \bar{\tau}_L^- + \bar{\tau}_R^+$	$(8.685 \pm 0.007) \times 10^{-3}$
$b + \bar{b}_R + \bar{N}_3$	$(4.21 \pm 0.015) \times 10^{-2}$	$\nu_e + \bar{\nu}_e + \bar{N}_4$	$(2.031 \pm 0.005) \times 10^{-2}$	$A + \bar{\tau}_R^- + \bar{\tau}_L^+$	$(8.685 \pm 0.007) \times 10^{-3}$
$\bar{b} + \bar{b}_R + \bar{N}_3$	$(4.2 \pm 0.016) \times 10^{-2}$	$\gamma + \bar{\tau}_L^- + \bar{\tau}_R^+$	$(1.871 \pm 0.009) \times 10^{-2}$	$H + \bar{N}_2 + \bar{N}_4$	$(8.332 \pm 0.025) \times 10^{-3}$
$e^+ + \bar{e}_R^- + \bar{N}_3$	$(3.788 \pm 0.009) \times 10^{-2}$	$h + \bar{\nu}_\mu + \bar{\nu}_\mu$	$(1.836 \pm 0.003) \times 10^{-2}$	$A + \bar{N}_1 + \bar{N}_3$	$(8.225 \pm 0.024) \times 10^{-3}$
$\bar{u} + \bar{u}_R + \bar{N}_2$	$(3.777 \pm 0.009) \times 10^{-2}$	$H^- + \bar{C}_1^+ + \bar{N}_3$	$(1.831 \pm 0.006) \times 10^{-2}$	$e^- + \bar{e}_L^+ + \bar{N}_4$	$(7.928 \pm 0.024) \times 10^{-3}$

$e^+ + \bar{e}_L + \bar{N}_4$	$(7.897 \pm 0.016) \times 10^{-3}$	$H^- + \bar{\mu}_R^+ + \bar{\nu}_\mu$	$(2.1 \pm 0.004) \times 10^{-3}$	$A + \bar{\mu}_L^- + \bar{\mu}_L^+$	$(2.479 \pm 0.007) \times 10^{-4}$
$H + \bar{N}_1 + \bar{N}_4$	$(6.939 \pm 0.020) \times 10^{-3}$	$H^+ + \bar{\mu}_R^- + \bar{\nu}_\mu$	$(2.1 \pm 0.002) \times 10^{-3}$	$H + \bar{\mu}_L^- + \bar{\mu}_L^+$	$(2.439 \pm 0.006) \times 10^{-4}$
$H^+ + \bar{\mu}_L^- + \bar{\nu}_\mu$	$(6.722 \pm 0.008) \times 10^{-3}$	$A + \bar{\nu}_e + \bar{\nu}_e$	$(2.068 \pm 0.001) \times 10^{-3}$	$A + \bar{N}_4 + \bar{N}_4$	$(2.435 \pm 0.006) \times 10^{-4}$
$H^- + \bar{\mu}_L^+ + \bar{\nu}_\mu$	$(6.711 \pm 0.009) \times 10^{-3}$	$h + \bar{\mu}_L^- + \bar{\mu}_L^+$	$(1.585 \pm 0.002) \times 10^{-3}$	$\gamma + \bar{N}_3 + \bar{N}_3$	$(2.168 \pm 0.008) \times 10^{-4}$
$\gamma + \bar{N}_4 + \bar{N}_4$	$(6.512 \pm 0.012) \times 10^{-3}$	$h + \bar{\mu}_R^- + \bar{\mu}_R^+$	$(1.515 \pm 0.002) \times 10^{-3}$	$A + \bar{t}_R + \bar{t}_R$	$(2.047 \pm 0.002) \times 10^{-4}$
$H + \bar{C}_2^+ + \bar{C}_2^-$	$(5.812 \pm 0.024) \times 10^{-3}$	$h + \bar{N}_3 + \bar{N}_4$	$(1.477 \pm 0.005) \times 10^{-3}$	$h + \bar{\nu}_\tau + \bar{\nu}_\tau$	$(1.713 \pm 0.001) \times 10^{-4}$
$s + \bar{s}_L + \bar{N}_3$	$(5.02 \pm 0.014) \times 10^{-3}$	$A + \bar{t}_L + \bar{t}_R$	$(1.436 \pm 0.002) \times 10^{-3}$	$h + \bar{\nu}_e + \bar{\nu}_e$	$(1.707 \pm 0.001) \times 10^{-4}$
$d + \bar{d}_L + \bar{N}_3$	$(5.02 \pm 0.014) \times 10^{-3}$	$A + \bar{t}_R + \bar{t}_L$	$(1.434 \pm 0.002) \times 10^{-3}$	$h + \bar{b}_L + \bar{b}_R$	$(1.577 \pm 0.002) \times 10^{-4}$
$\bar{s} + \bar{s}_L + \bar{N}_3$	$(5.013 \pm 0.014) \times 10^{-3}$	$h + \bar{N}_4 + \bar{N}_4$	$(1.424 \pm 0.003) \times 10^{-3}$	$h + \bar{b}_R + \bar{b}_L$	$(1.577 \pm 0.002) \times 10^{-4}$
$\bar{d} + \bar{d}_L + \bar{N}_3$	$(5.013 \pm 0.014) \times 10^{-3}$	$H + \bar{t}_L + \bar{t}_L$	$(1.392 \pm 0.001) \times 10^{-3}$	$h + \bar{e}_L^- + \bar{e}_L^+$	$(1.346 \pm 0.001) \times 10^{-4}$
$A + W^+ + W^-$	$(4.714 \pm 0.023) \times 10^{-3}$	$A + \bar{\mu}_R^- + \bar{\mu}_R^+$	$(1.218 \pm 0.000) \times 10^{-3}$	$h + \bar{e}_R^- + \bar{e}_R^+$	$(1.276 \pm 0.001) \times 10^{-4}$
$H^+ + \bar{C}_2^- + \bar{N}_4$	$(4.563 \pm 0.020) \times 10^{-3}$	$A + \bar{t}_L + \bar{t}_L$	$(1.198 \pm 0.001) \times 10^{-3}$	$H^- + \bar{b}_R + \bar{t}_R$	$(1.225 \pm 0.001) \times 10^{-4}$
$H^- + \bar{C}_2^+ + \bar{N}_4$	$(4.559 \pm 0.020) \times 10^{-3}$	$s + \bar{s}_R + \bar{N}_3$	$(1.008 \pm 0.002) \times 10^{-3}$	$H^+ + \bar{b}_R + \bar{t}_R$	$(1.225 \pm 0.001) \times 10^{-4}$
$H^- + \bar{e}_L^+ + \bar{\nu}_e$	$(4.421 \pm 0.008) \times 10^{-3}$	$d + \bar{d}_R + \bar{N}_3$	$(1.008 \pm 0.002) \times 10^{-3}$	$h + \bar{s}_L + \bar{s}_L$	$(1.164 \pm 0.001) \times 10^{-4}$
$H^+ + \bar{e}_L^- + \bar{\nu}_e$	$(4.421 \pm 0.008) \times 10^{-3}$	$\bar{s} + \bar{s}_R + \bar{N}_3$	$(1.003 \pm 0.002) \times 10^{-3}$	$h + \bar{d}_L + \bar{d}_L$	$(1.164 \pm 0.001) \times 10^{-4}$
$\bar{u} + \bar{u}_L + \bar{N}_3$	$(4.4 \pm 0.011) \times 10^{-3}$	$\bar{d} + \bar{d}_R + \bar{N}_3$	$(1.003 \pm 0.002) \times 10^{-3}$	$h + \bar{N}_3 + \bar{N}_3$	$(1.104 \pm 0.002) \times 10^{-4}$
$\bar{c} + \bar{c}_L + \bar{N}_3$	$(4.4 \pm 0.011) \times 10^{-3}$	$H^- + \bar{b}_L + \bar{t}_R$	$(8.72 \pm 0.010) \times 10^{-4}$	$H + \bar{b}_R + \bar{b}_L$	$(8.84 \pm 0.009) \times 10^{-5}$
$u + \bar{u}_L + \bar{N}_3$	$(4.373 \pm 0.011) \times 10^{-3}$	$H^+ + \bar{b}_L + \bar{t}_R$	$(8.72 \pm 0.010) \times 10^{-4}$	$H + \bar{b}_L + \bar{b}_R$	$(8.838 \pm 0.011) \times 10^{-5}$
$c + \bar{c}_L + \bar{N}_3$	$(4.373 \pm 0.011) \times 10^{-3}$	$A + \bar{e}_R^- + \bar{e}_R^+$	$(8.331 \pm 0.006) \times 10^{-4}$	$A + \bar{b}_L + \bar{b}_R$	$(8.434 \pm 0.013) \times 10^{-5}$
$u + \bar{u}_R + \bar{N}_3$	$(4.175 \pm 0.011) \times 10^{-3}$	$H + \bar{t}_L + \bar{t}_R$	$(7.97 \pm 0.009) \times 10^{-4}$	$A + \bar{b}_R + \bar{b}_L$	$(8.433 \pm 0.012) \times 10^{-5}$
$c + \bar{c}_R + \bar{N}_3$	$(4.175 \pm 0.011) \times 10^{-3}$	$H + \bar{t}_R + \bar{t}_L$	$(7.969 \pm 0.011) \times 10^{-4}$	$h + \bar{u}_L + \bar{u}_L$	$(8.197 \pm 0.015) \times 10^{-5}$
$\bar{u} + \bar{u}_R + \bar{N}_3$	$(4.172 \pm 0.011) \times 10^{-3}$	$h + \bar{\mu}_L^- + \bar{\mu}_L^+$	$(7.956 \pm 0.010) \times 10^{-4}$	$h + \bar{c}_L + \bar{c}_L$	$(8.197 \pm 0.015) \times 10^{-5}$
$\bar{c} + \bar{c}_R + \bar{N}_3$	$(4.172 \pm 0.011) \times 10^{-3}$	$h + \bar{\mu}_R^- + \bar{\mu}_R^+$	$(7.929 \pm 0.010) \times 10^{-4}$	$H + W^+ + W^-$	$(7.703 \pm 0.042) \times 10^{-5}$
$h + H + Z$	$(3.473 \pm 0.010) \times 10^{-3}$	$\tau^- + \tau^+ + h$	$(7.698 \pm 0.030) \times 10^{-4}$	$h + H^+ + H^-$	$(6.848 \pm 0.011) \times 10^{-5}$
$\bar{s} + \bar{s}_R + \bar{N}_4$	$(3.302 \pm 0.015) \times 10^{-3}$	$H + \bar{N}_3 + \bar{N}_4$	$(7.402 \pm 0.018) \times 10^{-4}$	$h + \bar{b}_R + \bar{b}_R$	$(5.59 \pm 0.009) \times 10^{-5}$
$\bar{d} + \bar{d}_R + \bar{N}_4$	$(3.302 \pm 0.015) \times 10^{-3}$	$e^- + e^+ + h$	$(7.342 \pm 0.021) \times 10^{-4}$	$H^- + \bar{\tau}_R^+ + \bar{\nu}_\tau$	$(5.406 \pm 0.009) \times 10^{-5}$
$s + \bar{s}_R + \bar{N}_4$	$(3.297 \pm 0.015) \times 10^{-3}$	$A + \bar{N}_3 + \bar{N}_4$	$(6.705 \pm 0.022) \times 10^{-4}$	$H^+ + \bar{\tau}_R^- + \bar{\nu}_\tau$	$(5.406 \pm 0.009) \times 10^{-5}$
$d + \bar{d}_R + \bar{N}_4$	$(3.297 \pm 0.015) \times 10^{-3}$	$H^- + \bar{b}_R + \bar{t}_L$	$(6.18 \pm 0.009) \times 10^{-4}$	$\mu^- + \mu^+ + H$	$(5.403 \pm 0.029) \times 10^{-5}$
$H^+ + \bar{C}_2^- + \bar{N}_3$	$(3.0 \pm 0.009) \times 10^{-3}$	$H^+ + \bar{b}_R + \bar{t}_L$	$(6.18 \pm 0.009) \times 10^{-4}$	$h + H + A$	$(5.263 \pm 0.006) \times 10^{-5}$
$H^- + \bar{C}_2^+ + \bar{N}_3$	$(2.993 \pm 0.009) \times 10^{-3}$	$H + \bar{N}_4 + \bar{N}_4$	$(4.852 \pm 0.009) \times 10^{-4}$	$A + \bar{N}_3 + \bar{N}_3$	$(4.818 \pm 0.035) \times 10^{-5}$
$s + \bar{s} + h$	$(2.983 \pm 0.011) \times 10^{-3}$	$H + \bar{t}_R + \bar{t}_R$	$(4.789 \pm 0.004) \times 10^{-4}$	$H + \bar{N}_3 + \bar{N}_3$	$(4.325 \pm 0.009) \times 10^{-5}$
$d + \bar{d} + h$	$(2.983 \pm 0.011) \times 10^{-3}$	$H + \bar{\mu}_R^- + \bar{\mu}_R^+$	$(4.177 \pm 0.004) \times 10^{-4}$	$h + \bar{b}_L + \bar{b}_L$	$(3.634 \pm 0.002) \times 10^{-5}$
$A + \bar{C}_2^+ + \bar{C}_2^-$	$(2.929 \pm 0.012) \times 10^{-3}$	$A + \bar{\mu}_L^- + \bar{\mu}_L^+$	$(4.039 \pm 0.004) \times 10^{-4}$	$A + \bar{b}_L + \bar{b}_L$	$(3.483 \pm 0.003) \times 10^{-5}$
$H^- + \bar{b}_L + \bar{t}_L$	$(2.647 \pm 0.003) \times 10^{-3}$	$A + \bar{\mu}_R^- + \bar{\mu}_R^+$	$(4.037 \pm 0.004) \times 10^{-4}$	$H + \bar{b}_L + \bar{b}_L$	$(2.906 \pm 0.004) \times 10^{-5}$
$H^+ + \bar{b}_L + \bar{t}_L$	$(2.647 \pm 0.003) \times 10^{-3}$	$h + \bar{\tau}_R^- + \bar{\tau}_R^+$	$(3.879 \pm 0.005) \times 10^{-4}$	$h + \bar{\tau}_L^- + \bar{\tau}_L^+$	$(2.713 \pm 0.002) \times 10^{-5}$
$u + \bar{u} + h$	$(2.304 \pm 0.007) \times 10^{-3}$	$h + \bar{\tau}_L^- + \bar{\tau}_L^+$	$(3.877 \pm 0.005) \times 10^{-4}$	$A + \bar{b}_R + \bar{b}_R$	$(2.361 \pm 0.003) \times 10^{-5}$
$c + \bar{c} + h$	$(2.304 \pm 0.007) \times 10^{-3}$	$h + \bar{\tau}_R^- + \bar{\tau}_R^+$	$(3.763 \pm 0.003) \times 10^{-4}$	$H + \gamma + Z$	$(1.98 \pm 0.015) \times 10^{-5}$
$A + Z + Z$	$(2.187 \pm 0.009) \times 10^{-3}$	$H + \bar{\mu}_L^- + \bar{\mu}_L^+$	$(3.398 \pm 0.004) \times 10^{-4}$	$h + A + \gamma$	$(1.919 \pm 0.009) \times 10^{-5}$
$A + \bar{\nu}_\tau + \bar{\nu}_\tau$	$(2.105 \pm 0.001) \times 10^{-3}$	$H + \bar{\mu}_R^- + \bar{\mu}_R^+$	$(3.392 \pm 0.004) \times 10^{-4}$		

$H + \bar{b}_R + \bar{b}_R$	$(1.83 \pm 0.003) \times 10^{-5}$	$\bar{s} + \bar{c}_R + \bar{C}_2^-$	0	$g + \bar{d}_R + \bar{d}_L$	0
$h + \bar{u}_R + \bar{u}_R$	$(1.254 \pm 0.001) \times 10^{-5}$	$\bar{s} + \bar{c}_R + \bar{C}_1^-$	0	$g + \bar{d}_L + \bar{d}_R$	0
$h + \bar{c}_R + \bar{c}_R$	$(1.254 \pm 0.001) \times 10^{-5}$	$\bar{d} + \bar{u}_R + \bar{C}_2^-$	0	$g + \bar{c}_R + \bar{c}_L$	0
$\nu_\tau + \bar{\nu}_\tau + H$	$(1.193 \pm 0.002) \times 10^{-5}$	$\bar{d} + \bar{u}_R + \bar{C}_1^-$	0	$g + \bar{c}_L + \bar{c}_R$	0
$\nu_e + \bar{\nu}_e + H$	$(1.193 \pm 0.002) \times 10^{-5}$	$\bar{c} + \bar{s}_R + \bar{C}_2^+$	0	$g + \bar{N}_4 + \bar{g}$	0
$H + \bar{\tau}_L^- + \bar{\tau}_L^+$	$(7.692 \pm 0.005) \times 10^{-6}$	$\bar{c} + \bar{s}_R + \bar{C}_1^+$	0	$g + \bar{N}_3 + \bar{g}$	0
$H + Z + Z$	$(5.364 \pm 0.037) \times 10^{-6}$	$\bar{\nu}_e + \bar{e}_R^- + \bar{C}_2^+$	0	$g + \bar{N}_2 + \bar{g}$	0
$A + \bar{e}_L^- + \bar{e}_L^+$	$(4.998 \pm 0.008) \times 10^{-6}$	$\bar{\nu}_e + \bar{e}_R^- + \bar{C}_1^+$	0	$g + \bar{N}_1 + \bar{g}$	0
$A + \bar{\tau}_R^- + \bar{\tau}_R^+$	$(4.87 \pm 0.007) \times 10^{-6}$	$Z + \bar{u}_R + \bar{u}_L$	0	$e^- + e^+ + A$	0
$h + A + Z$	$(4.753 \pm 0.030) \times 10^{-6}$	$Z + \bar{u}_L + \bar{u}_R$	0	$e^- + \bar{\nu}_e + H^+$	0
$H^- + \bar{u}_L + \bar{d}_L$	$(1.722 \pm 0.003) \times 10^{-6}$	$Z + \bar{s}_R + \bar{s}_L$	0	$e^+ + \nu_e + H^-$	0
$H^+ + \bar{u}_L + \bar{d}_L$	$(1.722 \pm 0.003) \times 10^{-6}$	$Z + \bar{s}_L + \bar{s}_R$	0	$d + \bar{u}_R + \bar{C}_2^+$	0
$H^- + \bar{s}_L + \bar{c}_L$	$(1.721 \pm 0.003) \times 10^{-6}$	$Z + \bar{g} + \bar{g}$	0	$d + \bar{u}_R + \bar{C}_1^+$	0
$H^+ + \bar{s}_L + \bar{c}_L$	$(1.721 \pm 0.003) \times 10^{-6}$	$Z + \bar{e}_R^- + \bar{e}_L^+$	0	$d + \bar{d} + A$	0
$H + H + A$	$(1.622 \pm 0.001) \times 10^{-6}$	$Z + \bar{e}_L^- + \bar{e}_R^+$	0	$c + \bar{s}_R + \bar{C}_2^-$	0
$H + \bar{\nu}_\tau + \bar{\nu}_\tau$	$(1.27 \pm 0.001) \times 10^{-6}$	$Z + \bar{d}_R + \bar{d}_L$	0	$c + \bar{s}_R + \bar{C}_1^-$	0
$H + \bar{\nu}_e + \bar{\nu}_e$	$(1.268 \pm 0.001) \times 10^{-6}$	$Z + \bar{d}_L + \bar{d}_R$	0	$c + \bar{c} + A$	0
$H + H^+ + H^-$	$(1.26 \pm 0.001) \times 10^{-6}$	$Z + \bar{c}_R + \bar{c}_L$	0	$\nu_\tau + \bar{\nu}_\tau + A$	0
$h + \bar{s}_R + \bar{s}_R$	$(1.073 \pm 0.001) \times 10^{-6}$	$Z + \bar{c}_L + \bar{c}_R$	0	$\nu_\mu + \bar{\nu}_\mu + A$	0
$h + \bar{d}_R + \bar{d}_R$	$(1.073 \pm 0.001) \times 10^{-6}$	$W^- + \bar{u}_R + \bar{d}_R$	0	$\nu_e + \bar{e}_R^+ + \bar{C}_2^-$	0
$H + \bar{\tau}_R^- + \bar{\tau}_R^+$	$(1.008 \pm 0.001) \times 10^{-6}$	$W^- + \bar{u}_R + \bar{d}_L$	0	$\nu_e + \bar{e}_R^+ + \bar{C}_1^-$	0
$H + \bar{e}_L^- + \bar{e}_L^+$	$(8.738 \pm 0.012) \times 10^{-7}$	$W^- + \bar{u}_L + \bar{d}_R$	0	$\nu_e + \bar{\nu}_e + A$	0
$H + \bar{s}_L + \bar{s}_L$	$(8.308 \pm 0.014) \times 10^{-7}$	$W^- + \bar{e}_R^+ + \bar{\nu}_e$	0	$\mu^- + \mu^+ + A$	0
$H + \bar{d}_L + \bar{d}_L$	$(8.308 \pm 0.014) \times 10^{-7}$	$W^- + \bar{s}_R + \bar{c}_R$	0	$\mu^- + \bar{\nu}_\mu + H^+$	0
$H + \bar{u}_L + \bar{u}_L$	$(7.944 \pm 0.013) \times 10^{-7}$	$W^- + \bar{s}_R + \bar{c}_L$	0	$\mu^+ + \nu_\mu + H^-$	0
$H + \bar{c}_L + \bar{c}_L$	$(7.944 \pm 0.013) \times 10^{-7}$	$W^- + \bar{s}_L + \bar{c}_R$	0	$\gamma + \bar{u}_R + \bar{u}_L$	0
$H + \bar{e}_R^- + \bar{e}_R^+$	$(7.248 \pm 0.010) \times 10^{-7}$	$W^- + \bar{s}_L + \bar{c}_R$	0	$\gamma + \bar{u}_L + \bar{u}_R$	0
$H^- + W^+ + Z$	$(6.293 \pm 0.051) \times 10^{-7}$	$W^+ + \bar{s}_R + \bar{c}_R$	0	$\gamma + \bar{s}_R + \bar{s}_L$	0
$H^+ + W^- + Z$	$(6.293 \pm 0.051) \times 10^{-7}$	$W^+ + \bar{s}_R + \bar{c}_L$	0	$\gamma + \bar{s}_L + \bar{s}_R$	0
$s + \bar{s} + H$	$(4.051 \pm 0.015) \times 10^{-7}$	$W^+ + \bar{s}_L + \bar{c}_R$	0	$\gamma + \bar{g} + \bar{g}$	0
$d + \bar{d} + H$	$(4.051 \pm 0.015) \times 10^{-7}$	$W^+ + \bar{e}_R^- + \bar{\nu}_e$	0	$\gamma + \bar{e}_R^- + \bar{e}_L^+$	0
$u + \bar{u} + H$	$(3.143 \pm 0.010) \times 10^{-7}$	$W^+ + \bar{u}_R + \bar{d}_R$	0	$\gamma + \bar{e}_L^- + \bar{e}_R^+$	0
$c + \bar{c} + H$	$(3.143 \pm 0.010) \times 10^{-7}$	$W^+ + \bar{u}_R + \bar{d}_L$	0	$\gamma + \bar{d}_R + \bar{d}_L$	0
$A + H^+ + H^-$	$(2.054 \pm 0.002) \times 10^{-7}$	$W^+ + \bar{u}_L + \bar{d}_R$	0	$\gamma + \bar{d}_L + \bar{d}_R$	0
$H + \bar{u}_R + \bar{u}_R$	$(1.125 \pm 0.001) \times 10^{-7}$	$H^- + \bar{u}_R + \bar{d}_R$	0	$\gamma + \bar{c}_R + \bar{c}_L$	0
$H + \bar{c}_R + \bar{c}_R$	$(1.125 \pm 0.001) \times 10^{-7}$	$H^- + \bar{u}_R + \bar{d}_L$	0	$\gamma + \bar{c}_L + \bar{c}_R$	0
$A + \bar{s}_L + \bar{s}_L$	$(1.123 \pm 0.001) \times 10^{-7}$	$H^- + \bar{u}_L + \bar{d}_R$	0	$\bar{u} + d + H^+$	0
$A + \bar{d}_L + \bar{d}_L$	$(1.123 \pm 0.001) \times 10^{-7}$	$H^- + \bar{e}_R^+ + \bar{\nu}_e$	0	$\bar{u} + \bar{d}_R + \bar{C}_2^+$	0
$e^- + e^+ + H$	$(9.987 \pm 0.034) \times 10^{-8}$	$H^- + \bar{s}_R + \bar{c}_R$	0	$\bar{u} + \bar{d}_R + \bar{C}_1^+$	0
$A + \bar{u}_L + \bar{u}_L$	$(7.949 \pm 0.007) \times 10^{-8}$	$H^- + \bar{s}_R + \bar{c}_L$	0	$\bar{s} + c + H^-$	0

$A + \bar{c}_L + \bar{c}_L$	$(7.949 \pm 0.007) \times 10^{-8}$
$A + A + A$	$(4.97 \pm 0.007) \times 10^{-8}$
$A + \bar{u}_R + \bar{u}_R$	$(1.799 \pm 0.001) \times 10^{-8}$
$A + \bar{c}_R + \bar{c}_R$	$(1.799 \pm 0.001) \times 10^{-8}$
$H + \bar{s}_R + \bar{s}_R$	$(7.371 \pm 0.013) \times 10^{-9}$
$H + \bar{d}_R + \bar{d}_R$	$(7.371 \pm 0.013) \times 10^{-9}$
$A + \bar{s}_R + \bar{s}_R$	$(4.654 \pm 0.004) \times 10^{-9}$
$A + \bar{d}_R + \bar{d}_R$	$(4.654 \pm 0.004) \times 10^{-9}$
$u + \bar{d}_R + \bar{C}_2^-$	0
$u + \bar{d}_R + \bar{C}_1^-$	0
$u + \bar{u} + A$	0
$u + \bar{d} + H^-$	0
$s + \bar{c}_R + \bar{C}_2^+$	0
$s + \bar{c}_R + \bar{C}_1^+$	0
$s + \bar{s} + A$	0
$s + \bar{c} + H^+$	0
$h + h + h$	0
$h + h + \gamma$	0
$h + h + H$	0
$h + g + g$	0
$h + \bar{u}_R + \bar{u}_L$	0
$h + \bar{u}_L + \bar{u}_R$	0
$h + \bar{s}_R + \bar{s}_L$	0
$h + \bar{s}_L + \bar{s}_R$	0
$h + \bar{g} + \bar{g}$	0
$h + \bar{e}_R^- + \bar{e}_L^+$	0
$h + \bar{e}_L^- + \bar{e}_R^+$	0
$h + \bar{d}_R + \bar{d}_L$	0
$h + \bar{d}_L + \bar{d}_R$	0
$h + \bar{c}_R + \bar{c}_L$	0
$h + \bar{c}_L + \bar{c}_R$	0
$h + \gamma + \gamma$	0
$h + H + \gamma$	0
$h + H + H$	0
$h + A + A$	0
$g + \bar{u}_R + \bar{u}_L$	0
$g + \bar{u}_L + \bar{u}_R$	0
$g + \bar{s}_R + \bar{s}_L$	0
$g + \bar{s}_L + \bar{s}_R$	0
$g + \bar{g} + \bar{g}$	0

$H^- + \bar{s}_L + \bar{c}_R$	0
$H^- + \gamma + W^+$	0
$H^+ + \bar{s}_R + \bar{c}_R$	0
$H^+ + \bar{s}_R + \bar{c}_L$	0
$H^+ + \bar{s}_L + \bar{c}_R$	0
$H^+ + \bar{e}_R^- + \bar{\nu}_e$	0
$H^+ + \bar{u}_R + \bar{d}_R$	0
$H^+ + \bar{u}_R + \bar{d}_L$	0
$H^+ + \bar{u}_L + \bar{d}_R$	0
$H^+ + \gamma + W^-$	0
$H + g + g$	0
$H + \bar{u}_R + \bar{u}_L$	0
$H + \bar{u}_L + \bar{u}_R$	0
$H + \bar{s}_R + \bar{s}_L$	0
$H + \bar{s}_L + \bar{s}_R$	0
$H + \bar{g} + \bar{g}$	0
$H + \bar{e}_R^- + \bar{e}_L^+$	0
$H + \bar{e}_L^- + \bar{e}_R^+$	0
$H + \bar{d}_R + \bar{d}_L$	0
$H + \bar{d}_L + \bar{d}_R$	0
$H + \bar{c}_R + \bar{c}_L$	0
$H + \bar{c}_L + \bar{c}_R$	0
$H + \gamma + \gamma$	0
$H + H + \gamma$	0
$H + H + H$	0
$H + A + A$	0
$A + g + g$	0
$A + \bar{u}_R + \bar{u}_L$	0
$A + \bar{u}_L + \bar{u}_R$	0
$A + \bar{s}_R + \bar{s}_L$	0
$A + \bar{s}_L + \bar{s}_R$	0
$A + \bar{g} + \bar{g}$	0
$A + \bar{e}_R^- + \bar{e}_L^+$	0
$A + \bar{e}_L^- + \bar{e}_R^+$	0
$A + \bar{d}_R + \bar{d}_L$	0
$A + \bar{d}_L + \bar{d}_R$	0
$A + \bar{c}_R + \bar{c}_L$	0
$A + \bar{c}_L + \bar{c}_R$	0
$A + \gamma + \gamma$	0
$A + \gamma + Z$	0
$A + A + \gamma$	0