

E8	$1/2i^*\omega_T^3$	$\frac{1}{2}\omega_S^3$	U^3	V^3	w	$x(R)$	$y(G)$	$z(B)$	B_2^*	g^3	g^8	W^3	B_1^3	$\frac{1}{2}Y$	Q		
Gravitons?									$\sqrt{2/3}$			weak-iso		hypercharge	charge		
ω_L^\wedge	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0		
ω_L^\vee	-1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0		
ω_R^\wedge	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0		
ω_R^\vee	1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0		
EW-bosons																	
W^+	0	0	1	1	0	0	0	0	0	0	0	1	0	0	1		
W^-	0	0	-1	-1	0	0	0	0	0	0	0	-1	0	0	-1		
B_1^+	0	0	-1	1	0	0	0	0	0	0	0	0	1	1	1		
B_1^-	0	0	1	-1	0	0	0	0	0	0	0	0	-1	-1	-1		
E8	$1/2i^*\omega_T^3$	$\frac{1}{2}\omega_S^3$	U^3	V^3	w	$x(R)$	$y(G)$	$z(B)$	B_2^*	g^3	g^8	W^3	B_1^3	$\frac{1}{2}Y$	Q		
Frame-Higgs									$\sqrt{2/3}$								
$e_S^\wedge\phi_+$	0	-1	0	1	0	0	0	0	0	0	0	1/2	1/2	1/2	1		
$e_S^\vee\phi_+$	0	1	0	1	0	0	0	0	0	0	0	1/2	1/2	1/2	1		
$e_S^\wedge\phi_-$	0	1	0	-1	0	0	0	0	0	0	0	-1/2	-1/2	-1/2	-1		
$e_S^\vee\phi_-$	0	-1	0	-1	0	0	0	0	0	0	0	-1/2	-1/2	-1/2	-1		
$e_S^\wedge\phi_0$	0	1	1	0	0	0	0	0	0	0	0	1/2	-1/2	-1/2	0		
$e_S^\vee\phi_0$	0	-1	1	0	0	0	0	0	0	0	0	1/2	-1/2	-1/2	0		
$e_S^\wedge\phi_1$	0	1	-1	0	0	0	0	0	0	0	0	-1/2	1/2	1/2	0		
$e_S^\vee\phi_1$	0	-1	-1	0	0	0	0	0	0	0	0	-1/2	1/2	1/2	0		
$e_T^\wedge\phi_+$	-1	0	0	1	0	0	0	0	0	0	0	1/2	1/2	1/2	1		
$e_T^\vee\phi_+$	1	0	0	1	0	0	0	0	0	0	0	1/2	1/2	1/2	1		
$e_T^\wedge\phi_-$	1	0	0	-1	0	0	0	0	0	0	0	-1/2	-1/2	-1/2	-1		
$e_T^\vee\phi_-$	-1	0	0	-1	0	0	0	0	0	0	0	-1/2	-1/2	-1/2	-1		
$e_T^\wedge\phi_0$	-1	0	-1	0	0	0	0	0	0	0	0	-1/2	1/2	1/2	0		
$e_T^\vee\phi_0$	-1	0	1	0	0	0	0	0	0	0	0	1/2	-1/2	-1/2	0		
$e_T^\wedge\phi_1$	1	0	-1	0	0	0	0	0	0	0	0	-1/2	1/2	1/2	0		
$e_T^\vee\phi_1$	-1	0	-1	0	0	0	0	0	0	0	0	-1/2	1/2	1/2	0		
E8	$1/2i^*\omega_T^3$	$\frac{1}{2}\omega_S^3$	U^3	V^3	w	x	y	z	B_2^*	g^3	g^8	W^3	B_1^3	$\frac{1}{2}Y$	Q		
G1: Leptons									$\sqrt{2/3}$			weak-iso=t3		hypercharge	charge		
ν_{eL}^\wedge	1/2	-1/2	1/2	1/2	1/2	-1/2	-1/2	-1/2	1/2	0	0	1/2	0	-1/2	0		
ν_{eL}^\vee	1/2	1/2	1/2	1/2	-1/2	-1/2	-1/2	-1/2	1/2	0	0	1/2	0	-1/2	0		
e_L^\wedge	1/2	-1/2	-1/2	-1/2	1/2	-1/2	-1/2	-1/2	1/2	0	0	-1/2	0	-1/2	-1		
e_L^\vee	1/2	1/2	-1/2	-1/2	-1/2	-1/2	-1/2	-1/2	1/2	0	0	-1/2	0	-1/2	-1		

ν_{eR}^{\wedge}	1/2	1/2	- 1/2	1/2	1/2	- 1/2	- 1/2	- 1/2	1/2	0	0	0	1/2	0	0		
ν_{eR}^{\vee}	1/2	- 1/2	- 1/2	1/2	- 1/2	- 1/2	- 1/2	- 1/2	1/2	0	0	0	1/2	0	0		
e_R^{\wedge}	1/2	1/2	1/2	- 1/2	1/2	- 1/2	- 1/2	- 1/2	1/2	0	0	0	- 1/2	-1	-1		
e_R^{\vee}	1/2	- 1/2	1/2	- 1/2	- 1/2	- 1/2	- 1/2	- 1/2	1/2	0	0	0	- 1/2	-1	-1		
<u>G1: Anti-leptons</u>																	
Anti- ν_{eL}^{\wedge}	1/2	- 1/2	1/2	- 1/2	1/2	1/2	1/2	1/2	- 1/2	0	0	0	- 1/2	0	0		
Anti- ν_{eL}^{\vee}	1/2	1/2	1/2	- 1/2	- 1/2	1/2	1/2	1/2	- 1/2	0	0	0	- 1/2	0	0		
Anti- e_L^{\wedge}	1/2	- 1/2	- 1/2	1/2	1/2	1/2	1/2	1/2	- 1/2	0	0	0	1/2	1	1		
Anti- e_L^{\vee}	1/2	1/2	- 1/2	1/2	- 1/2	1/2	1/2	1/2	- 1/2	0	0	0	1/2	1	1		
Anti- ν_{eR}^{\wedge}	1/2	1/2	- 1/2	- 1/2	1/2	1/2	1/2	1/2	- 1/2	0	0	- 1/2	0	1/2	0		
Anti- ν_{eR}^{\vee}	1/2	- 1/2	- 1/2	- 1/2	- 1/2	1/2	1/2	1/2	- 1/2	0	0	- 1/2	0	1/2	0		
Anti- e_R^{\wedge}	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	- 1/2	0	0	1/2	0	1/2	1		
Anti- e_R^{\vee}	1/2	- 1/2	1/2	1/2	- 1/2	1/2	1/2	1/2	- 1/2	0	0	1/2	0	1/2	1		
E8	1/2i* ω_T^3	1/2 ω_S^3	U ³	V ³	w	x	y	z	B ₂ *	g ³	g ⁸	W ³	B ₁ ³	1/2Y	Q		
<u>G2: Leptons</u>									sqrt(2/3)								
$\nu_{\mu L}^{\wedge}$	- 1/2	1/2	1/2	1/2	1/2	- 1/2	- 1/2	- 1/2	1/2	0	0	1/2	0	- 1/2	0		
$\nu_{\mu L}^{\vee}$	- 1/2	- 1/2	1/2	1/2	- 1/2	- 1/2	- 1/2	- 1/2	1/2	0	0	1/2	0	- 1/2	0		
μ_L^{\wedge}	- 1/2	1/2	- 1/2	- 1/2	1/2	- 1/2	- 1/2	- 1/2	1/2	0	0	- 1/2	0	- 1/2	-1		
μ_L^{\vee}	- 1/2	- 1/2	- 1/2	- 1/2	- 1/2	- 1/2	- 1/2	- 1/2	1/2	0	0	- 1/2	0	- 1/2	-1		
$\nu_{\mu R}^{\wedge}$	- 1/2	- 1/2	- 1/2	1/2	1/2	- 1/2	- 1/2	- 1/2	1/2	0	0	0	1/2	0	0		
$\nu_{\mu R}^{\vee}$	- 1/2	1/2	- 1/2	1/2	- 1/2	- 1/2	- 1/2	- 1/2	1/2	0	0	0	1/2	0	0		
μ_R^{\wedge}	- 1/2	1/2	1/2	- 1/2	1/2	- 1/2	- 1/2	- 1/2	1/2	0	0	0	- 1/2	-1	-1		
μ_R^{\vee}	- 1/2	- 1/2	1/2	- 1/2	- 1/2	- 1/2	- 1/2	- 1/2	1/2	0	0	0	- 1/2	-1	-1		
Anti- $\nu_{\mu L}^{\wedge}$	- 1/2	1/2	1/2	- 1/2	1/2	1/2	1/2	1/2	- 1/2	0	0	0	- 1/2	0	0		
Anti- $\nu_{\mu L}^{\vee}$	- 1/2	- 1/2	1/2	- 1/2	- 1/2	1/2	1/2	1/2	- 1/2	0	0	0	- 1/2	0	0		
Anti- μ_L^{\wedge}	- 1/2	1/2	- 1/2	1/2	1/2	1/2	1/2	1/2	- 1/2	0	0	0	1/2	1	1		
Anti- μ_L^{\vee}	- 1/2	- 1/2	- 1/2	1/2	- 1/2	1/2	1/2	1/2	- 1/2	0	0	0	1/2	1	1		
Anti- $\nu_{\mu R}^{\wedge}$	- 1/2	- 1/2	- 1/2	- 1/2	1/2	1/2	1/2	1/2	- 1/2	0	0	- 1/2	0	1/2	0		
Anti- $\nu_{\mu R}^{\vee}$	- 1/2	1/2	- 1/2	- 1/2	- 1/2	1/2	1/2	1/2	- 1/2	0	0	- 1/2	0	1/2	0		
Anti- μ_R^{\wedge}	- 1/2	- 1/2	1/2	1/2	1/2	1/2	1/2	1/2	- 1/2	0	0	1/2	0	1/2	1		
Anti- μ_R^{\vee}	- 1/2	1/2	1/2	1/2	- 1/2	1/2	1/2	1/2	- 1/2	0	0	1/2	0	1/2	1		
E8	1/2i* ω_T^3	1/2 ω_S^3	U ³	V ³	w	x	y	z	B ₂ *	g ³	g ⁸	W ³	B ₁ ³	1/2Y	Q	Start	Result
<u>G3: Root Leptons (=boson)</u>									sqrt(2/3)								
Physical Gen 3 ("result") = Root gen 3 + gen 1 or 2 particle ("start")																	
$\nu_{\tau L}^{\wedge}$			1		1				0	0	0.00	1/2	- 1/2	- 1/2	0	ν_{eR}^{\vee}	ν_{eL}^{\wedge}
$\nu_{\tau L}^{\vee}$			1		-1				0	0	0.00	1/2	- 1/2	- 1/2	0	ν_{eR}^{\wedge}	ν_{eL}^{\vee}
τ_L^{\wedge}				-1	1				0	0	0.00	- 1/2	- 1/2	- 1/2	-1	ν_{eR}^{\vee}	e_L^{\wedge}

τ_L^\vee				-1	-1				0	0	0.00	-1/2	-1/2	-1/2	-1	ν_{eR}^\wedge	e_L^\vee
$\nu_{\tau R}^\wedge$	-1				1				0	0	0.00	0	0	0	0	ν_{eR}^\vee	$\nu_{\mu R}^\wedge$
$\nu_{\tau R}^\vee$	-1				-1				0	0	0.00	0	0	0	0	ν_{eR}^\wedge	$\nu_{\mu R}^\vee$
added lepton									1/2				1/2				
τ_R^\wedge		1			1				0	0	0.00	0	0	0	0	e_R^\vee	e_R^\wedge
τ_R^\vee		-1			-1				0	0	0.00	0	0	0	0	e_R^\wedge	e_R^\vee
added lepton									1/2				1/2	-1	-1		
Anti- $\nu_{\tau L}^\wedge$	1				1				0	0	0.00	0	0	0	0	Anti- $\nu_{\mu L}^\vee$	Anti- ν_{eL}^\wedge
Anti- $\nu_{\tau L}^\vee$	1				-1				0	0	0.00	0	0	0	0	Anti- $\nu_{\mu L}^\wedge$	Anti- ν_{eL}^\vee
Anti- $\nu_{\tau R}^\wedge$			-1		1				0	0	0.00	-1/2	1/2	1/2	0	Anti- ν_{eL}^\vee	Anti- ν_{eR}^\wedge
Anti- $\nu_{\tau R}^\vee$			-1		-1				0	0	0.00	-1/2	1/2	1/2	0	Anti- ν_{eL}^\wedge	Anti- ν_{eR}^\vee
Anti- τ_R^\wedge				1	1				0	0	0.00	1/2	1/2	1/2	1	Anti- ν_{eL}^\vee	Anti- e_R^\wedge
Anti- τ_R^\vee				1	-1				0	0	0.00	1/2	1/2	1/2	1	Anti- ν_{eL}^\wedge	Anti- e_R^\vee
added lepton									-1/2				-1/2				
Anti- τ_L^\wedge		-1			1				0	0	0.00	0	0	0	0	Anti- e_L^\vee	Anti- e_L^\wedge
Anti- τ_L^\vee		1			-1				0	0	0.00	0	0	0	0	Anti- e_L^\wedge	Anti- e_L^\vee
added lepton									-1/2				1/2	1	1		
E8	1/2i* ω_T^3	1/2 ω_S^3	U ³	V ³	w	x	y	z	B ₂ *	g3	g ⁸	W ³	B ₁ ³	1/2Y	Q		
Quarks									sqrt(2/3)								
$u_L^{\wedge R}$	1/2	-1/2	1/2	1/2	1/2	-1/2	1/2	1/2	-1/6	1/2	0.29	1/2	0	1/6	2/3		
$u_L^{\vee R}$	1/2	1/2	1/2	1/2	-1/2	1/2	-1/2	1/2	-1/6	-1/2	0.29	1/2	0	1/6	2/3		
$u_L^{\wedge G}$	1/2	-1/2	1/2	1/2	1/2	1/2	-1/2	1/2	-1/6	-1/2	0.29	1/2	0	1/6	2/3		
$u_L^{\vee G}$	1/2	1/2	1/2	1/2	-1/2	-1/2	1/2	1/2	-1/6	1/2	0.29	1/2	0	1/6	2/3		
$u_L^{\wedge B}$	1/2	-1/2	1/2	1/2	1/2	1/2	1/2	-1/2	-1/6	0	-0.58	1/2	0	1/6	2/3		
$u_L^{\vee B}$	1/2	1/2	1/2	1/2	-1/2	1/2	1/2	-1/2	-1/6	0	-0.58	1/2	0	1/6	2/3		
$d_L^{\wedge R}$	1/2	-1/2	-1/2	-1/2	1/2	-1/2	1/2	1/2	-1/6	1/2	0.29	-1/2	0	1/6	-1/3		
$d_L^{\vee R}$	1/2	1/2	-1/2	-1/2	-1/2	1/2	-1/2	1/2	-1/6	-1/2	0.29	-1/2	0	1/6	-1/3		
$d_L^{\wedge G}$	1/2	-1/2	-1/2	-1/2	1/2	1/2	-1/2	1/2	-1/6	-1/2	0.29	-1/2	0	1/6	-1/3		
$d_L^{\vee G}$	1/2	1/2	-1/2	-1/2	-1/2	-1/2	1/2	1/2	-1/6	1/2	0.29	-1/2	0	1/6	-1/3		
$d_L^{\wedge B}$	1/2	-1/2	-1/2	-1/2	1/2	1/2	1/2	-1/2	-1/6	0	-0.58	-1/2	0	1/6	-1/3		
$d_L^{\vee B}$	1/2	1/2	-1/2	-1/2	-1/2	1/2	1/2	-1/2	-1/6	0	-0.58	-1/2	0	1/6	-1/3		
$u_R^{\wedge R}$	1/2	1/2	-1/2	1/2	1/2	-1/2	1/2	1/2	-1/6	1/2	0.29	0	1/2	2/3	2/3		
$u_R^{\vee R}$	1/2	-1/2	-1/2	1/2	-1/2	1/2	-1/2	1/2	-1/6	-1/2	0.29	0	1/2	2/3	2/3		
$u_R^{\wedge G}$	1/2	1/2	-1/2	1/2	1/2	1/2	-1/2	1/2	-1/6	-1/2	0.29	0	1/2	2/3	2/3		
$u_R^{\vee G}$	1/2	-1/2	-1/2	1/2	-1/2	-1/2	1/2	1/2	-1/6	1/2	0.29	0	1/2	2/3	2/3		
$u_R^{\wedge B}$	1/2	1/2	-1/2	1/2	1/2	1/2	1/2	-1/2	-1/6	0	-0.58	0	1/2	2/3	2/3		
$u_R^{\vee B}$	1/2	-1/2	-1/2	1/2	-1/2	1/2	1/2	-1/2	-1/6	0	-0.58	0	1/2	2/3	2/3		
$d_R^{\wedge R}$	1/2	1/2	1/2	-1/2	1/2	-1/2	1/2	1/2	-1/6	1/2	0.29	0	-1/2	-1/3	-1/3		

$d_R^{\vee R}$	1/2	- 1/2	1/2	- 1/2	- 1/2	1/2	- 1/2	1/2	- 1/6	- 1/2	0.29	0	- 1/2	- 1/3	- 1/3		
$d_R^{\wedge G}$	1/2	1/2	1/2	- 1/2	1/2	1/2	- 1/2	1/2	- 1/6	- 1/2	0.29	0	- 1/2	- 1/3	- 1/3		
$d_R^{\vee G}$	1/2	- 1/2	1/2	- 1/2	- 1/2	- 1/2	1/2	1/2	- 1/6	1/2	0.29	0	- 1/2	- 1/3	- 1/3		
$d_R^{\wedge B}$	1/2	1/2	1/2	- 1/2	1/2	1/2	1/2	- 1/2	- 1/6	0	-0.58	0	- 1/2	- 1/3	- 1/3		
$d_R^{\vee B}$	1/2	- 1/2	1/2	- 1/2	- 1/2	1/2	1/2	- 1/2	- 1/6	0	-0.58	0	- 1/2	- 1/3	- 1/3		
E8	$1/2i*\omega_T^3$	$\frac{1}{2}\omega_S^3$	U^3	V^3	w	x	y	z	B_2^*	g^3	g^8	W^3	B_1^3	$\frac{1}{2}Y$	Q		
<i>Quarks</i>									sqrt(2/3)								
Anti- $u_L^{\wedge r}$	1/2	- 1/2	1/2	- 1/2	1/2	1/2	- 1/2	- 1/2	1/6	- 1/2	-0.29	0	- 1/2	- 2/3	- 2/3		
Anti- $u_L^{\vee r}$	1/2	1/2	1/2	- 1/2	- 1/2	- 1/2	1/2	- 1/2	1/6	1/2	-0.29	0	- 1/2	- 2/3	- 2/3		
Anti- $u_L^{\wedge g}$	1/2	- 1/2	1/2	- 1/2	1/2	- 1/2	1/2	- 1/2	1/6	1/2	-0.29	0	- 1/2	- 2/3	- 2/3		
Anti- $u_L^{\vee g}$	1/2	1/2	1/2	- 1/2	- 1/2	1/2	- 1/2	- 1/2	1/6	- 1/2	-0.29	0	- 1/2	- 2/3	- 2/3		
Anti- $u_L^{\wedge b}$	1/2	- 1/2	1/2	- 1/2	1/2	- 1/2	- 1/2	1/2	1/6	0	0.58	0	- 1/2	- 2/3	- 2/3		
Anti- $u_L^{\vee b}$	1/2	1/2	1/2	- 1/2	- 1/2	- 1/2	- 1/2	1/2	1/6	0	0.58	0	- 1/2	- 2/3	- 2/3		
Anti- $d_L^{\wedge r}$	1/2	- 1/2	- 1/2	1/2	1/2	- 1/2	1/2	- 1/2	1/6	1/2	-0.29	0	1/2	1/3	1/3		
Anti- $d_L^{\vee r}$	1/2	1/2	- 1/2	1/2	- 1/2	1/2	- 1/2	- 1/2	1/6	- 1/2	-0.29	0	1/2	1/3	1/3		
Anti- $d_L^{\wedge g}$	1/2	- 1/2	- 1/2	1/2	1/2	1/2	- 1/2	- 1/2	1/6	- 1/2	-0.29	0	1/2	1/3	1/3		
Anti- $d_L^{\vee g}$	1/2	1/2	- 1/2	1/2	- 1/2	- 1/2	1/2	- 1/2	1/6	1/2	-0.29	0	1/2	1/3	1/3		
Anti- $d_L^{\wedge b}$	1/2	- 1/2	- 1/2	1/2	1/2	- 1/2	- 1/2	1/2	1/6	0	0.58	0	1/2	1/3	1/3		
Anti- $d_L^{\vee b}$	1/2	1/2	- 1/2	1/2	- 1/2	- 1/2	- 1/2	1/2	1/6	0	0.58	0	1/2	1/3	1/3		
Anti- $u_R^{\wedge r}$	1/2	1/2	- 1/2	- 1/2	1/2	1/2	- 1/2	- 1/2	1/6	- 1/2	-0.29	- 1/2	0	- 1/6	- 2/3		
Anti- $u_R^{\vee r}$	1/2	- 1/2	- 1/2	- 1/2	- 1/2	- 1/2	1/2	- 1/2	1/6	1/2	-0.29	- 1/2	0	- 1/6	- 2/3		
Anti- $u_R^{\wedge g}$	1/2	1/2	- 1/2	- 1/2	1/2	- 1/2	1/2	- 1/2	1/6	1/2	-0.29	- 1/2	0	- 1/6	- 2/3		
Anti- $u_R^{\vee g}$	1/2	- 1/2	- 1/2	- 1/2	- 1/2	1/2	- 1/2	- 1/2	1/6	- 1/2	-0.29	- 1/2	0	- 1/6	- 2/3		
Anti- $u_R^{\wedge b}$	1/2	1/2	- 1/2	- 1/2	1/2	- 1/2	- 1/2	1/2	1/6	0	0.58	- 1/2	0	- 1/6	- 2/3		
Anti- $u_R^{\vee b}$	1/2	- 1/2	- 1/2	- 1/2	- 1/2	- 1/2	- 1/2	1/2	1/6	0	0.58	- 1/2	0	- 1/6	- 2/3		
Anti- $d_R^{\wedge r}$	1/2	1/2	1/2	1/2	1/2	1/2	- 1/2	- 1/2	1/6	- 1/2	-0.29	1/2	0	- 1/6	1/3		
Anti- $d_R^{\vee r}$	1/2	- 1/2	1/2	1/2	- 1/2	- 1/2	1/2	- 1/2	1/6	1/2	-0.29	1/2	0	- 1/6	1/3		
Anti- $d_R^{\wedge g}$	1/2	1/2	1/2	1/2	1/2	- 1/2	1/2	- 1/2	1/6	1/2	-0.29	1/2	0	- 1/6	1/3		
Anti- $d_R^{\vee g}$	1/2	- 1/2	1/2	1/2	- 1/2	1/2	- 1/2	- 1/2	1/6	- 1/2	-0.29	1/2	0	- 1/6	1/3		
Anti- $d_R^{\wedge b}$	1/2	1/2	1/2	1/2	1/2	- 1/2	- 1/2	1/2	1/6	0	0.58	1/2	0	- 1/6	1/3		
Anti- $d_R^{\vee b}$	1/2	- 1/2	1/2	1/2	- 1/2	- 1/2	- 1/2	1/2	1/6	0	0.58	1/2	0	- 1/6	1/3		
E8	$1/2i*\omega_T^3$	$\frac{1}{2}\omega_S^3$	U^3	V^3	w	x	y	z	B_2^*	g^3	g^8	W^3	B_1^3	$\frac{1}{2}Y$	Q		
<i>Quarks</i>									sqrt(2/3)								
$c_L^{\wedge R}$	- 1/2	1/2	1/2	1/2	1/2	- 1/2	1/2	1/2	- 1/6	1/2	0.29	1/2	0	1/6	2/3		
$c_L^{\vee R}$	- 1/2	- 1/2	1/2	1/2	- 1/2	1/2	- 1/2	1/2	- 1/6	- 1/2	0.29	1/2	0	1/6	2/3		
$c_L^{\wedge G}$	- 1/2	1/2	1/2	1/2	1/2	1/2	- 1/2	1/2	- 1/6	- 1/2	0.29	1/2	0	1/6	2/3		
$c_L^{\vee G}$	- 1/2	- 1/2	1/2	1/2	- 1/2	- 1/2	1/2	1/2	- 1/6	1/2	0.29	1/2	0	1/6	2/3		
$c_L^{\wedge B}$	- 1/2	1/2	1/2	1/2	1/2	1/2	1/2	- 1/2	- 1/6	0	-0.58	1/2	0	1/6	2/3		

$c_L^{\vee B}$	- 1/2	- 1/2	1/2	1/2	- 1/2	1/2	1/2	- 1/2	- 1/6	0	−0.58	1/2	0	1/6	2/3		
$s_L^{\wedge R}$	- 1/2	1/2	- 1/2	- 1/2	1/2	- 1/2	1/2	1/2	- 1/6	1/2	0.29	− 1/2	0	1/6	− 1/3		
$s_L^{\vee R}$	- 1/2	- 1/2	- 1/2	- 1/2	- 1/2	1/2	- 1/2	1/2	- 1/6	− 1/2	0.29	− 1/2	0	1/6	− 1/3		
$s_L^{\wedge G}$	- 1/2	1/2	- 1/2	- 1/2	1/2	1/2	- 1/2	1/2	- 1/6	− 1/2	0.29	− 1/2	0	1/6	− 1/3		
$s_L^{\vee G}$	- 1/2	- 1/2	- 1/2	- 1/2	- 1/2	- 1/2	1/2	1/2	- 1/6	1/2	0.29	− 1/2	0	1/6	− 1/3		
$s_L^{\wedge B}$	- 1/2	1/2	- 1/2	- 1/2	1/2	1/2	1/2	- 1/2	- 1/6	0	−0.58	− 1/2	0	1/6	− 1/3		
$s_L^{\vee B}$	- 1/2	- 1/2	- 1/2	- 1/2	- 1/2	1/2	1/2	- 1/2	- 1/6	0	−0.58	− 1/2	0	1/6	− 1/3		
$c_R^{\wedge R}$	- 1/2	1/2	- 1/2	1/2	1/2	- 1/2	1/2	1/2	- 1/6	1/2	0.29	0	1/2	2/3	2/3		
$c_R^{\vee R}$	- 1/2	- 1/2	- 1/2	1/2	- 1/2	1/2	- 1/2	1/2	- 1/6	− 1/2	0.29	0	1/2	2/3	2/3		
$c_R^{\wedge G}$	- 1/2	1/2	- 1/2	1/2	1/2	1/2	- 1/2	1/2	- 1/6	− 1/2	0.29	0	1/2	2/3	2/3		
$c_R^{\vee G}$	- 1/2	- 1/2	- 1/2	1/2	- 1/2	- 1/2	1/2	1/2	- 1/6	1/2	0.29	0	1/2	2/3	2/3		
$c_R^{\wedge B}$	- 1/2	1/2	- 1/2	1/2	1/2	1/2	1/2	- 1/2	- 1/6	0	−0.58	0	1/2	2/3	2/3		
$c_R^{\vee B}$	- 1/2	- 1/2	- 1/2	1/2	- 1/2	1/2	1/2	- 1/2	- 1/6	0	−0.58	0	1/2	2/3	2/3		
$s_R^{\wedge R}$	- 1/2	1/2	1/2	- 1/2	1/2	1/2	- 1/2	1/2	- 1/6	− 1/2	0.29	0	− 1/2	− 1/3	− 1/3		
$s_R^{\vee R}$	- 1/2	- 1/2	1/2	- 1/2	- 1/2	- 1/2	1/2	1/2	- 1/6	1/2	0.29	0	− 1/2	− 1/3	− 1/3		
$s_R^{\wedge G}$	- 1/2	1/2	1/2	- 1/2	1/2	- 1/2	1/2	1/2	- 1/6	1/2	0.29	0	− 1/2	− 1/3	− 1/3		
$s_R^{\vee G}$	- 1/2	- 1/2	1/2	- 1/2	- 1/2	1/2	- 1/2	1/2	- 1/6	− 1/2	0.29	0	− 1/2	− 1/3	− 1/3		
$s_R^{\wedge B}$	- 1/2	1/2	1/2	- 1/2	1/2	1/2	1/2	- 1/2	- 1/6	0	−0.58	0	− 1/2	− 1/3	− 1/3		
$s_R^{\vee B}$	- 1/2	- 1/2	1/2	- 1/2	- 1/2	1/2	1/2	- 1/2	- 1/6	0	−0.58	0	− 1/2	− 1/3	− 1/3		
E8	$1/2i*\omega_T^3$	$\frac{1}{2}\omega_S^3$	U^3	V^3	w	x	y	z	B_2^*	g^3	g^8	W^3	B_1^3	$\frac{1}{2}Y$	Q		
<i>Quarks</i>									sqrt(2/3)								
Anti- $c_L^{\wedge r}$	- 1/2	1/2	1/2	- 1/2	1/2	1/2	- 1/2	- 1/2	1/6	− 1/2	−0.29	0	− 1/2	− 2/3	− 2/3		
Anti- $c_L^{\vee r}$	- 1/2	- 1/2	1/2	- 1/2	- 1/2	- 1/2	1/2	- 1/2	1/6	1/2	−0.29	0	− 1/2	− 2/3	− 2/3		
Anti- $c_L^{\wedge g}$	- 1/2	1/2	1/2	- 1/2	1/2	- 1/2	1/2	- 1/2	1/6	1/2	−0.29	0	− 1/2	− 2/3	− 2/3		
Anti- $c_L^{\vee g}$	- 1/2	- 1/2	1/2	- 1/2	- 1/2	1/2	- 1/2	- 1/2	1/6	− 1/2	−0.29	0	− 1/2	− 2/3	− 2/3		
Anti- $c_L^{\wedge b}$	- 1/2	1/2	1/2	- 1/2	1/2	- 1/2	- 1/2	1/2	1/6	0	0.58	0	− 1/2	− 2/3	− 2/3		
Anti- $c_L^{\vee b}$	- 1/2	- 1/2	1/2	- 1/2	- 1/2	- 1/2	- 1/2	1/2	1/6	0	0.58	0	− 1/2	− 2/3	− 2/3		
Anti- $s_L^{\wedge r}$	- 1/2	1/2	- 1/2	1/2	1/2	1/2	- 1/2	- 1/2	1/6	− 1/2	−0.29	0	1/2	1/3	1/3		
Anti- $s_L^{\vee r}$	- 1/2	- 1/2	- 1/2	1/2	- 1/2	- 1/2	1/2	- 1/2	1/6	1/2	−0.29	0	1/2	1/3	1/3		
Anti- $s_L^{\wedge g}$	- 1/2	1/2	- 1/2	1/2	1/2	1/2	- 1/2	- 1/2	1/6	− 1/2	−0.29	0	1/2	1/3	1/3		
Anti- $s_L^{\vee g}$	- 1/2	- 1/2	- 1/2	1/2	- 1/2	- 1/2	1/2	- 1/2	1/6	1/2	−0.29	0	1/2	1/3	1/3		
Anti- $s_L^{\wedge b}$	- 1/2	1/2	- 1/2	1/2	1/2	- 1/2	- 1/2	1/2	1/6	0	0.58	0	1/2	1/3	1/3		
Anti- $s_L^{\vee b}$	- 1/2	- 1/2	- 1/2	1/2	- 1/2	- 1/2	- 1/2	1/2	1/6	0	0.58	0	1/2	1/3	1/3		
Anti- $c_R^{\wedge r}$	- 1/2	1/2	- 1/2	- 1/2	1/2	1/2	- 1/2	- 1/2	1/6	− 1/2	−0.29	− 1/2	0	− 1/6	− 2/3		
Anti- $c_R^{\vee r}$	- 1/2	- 1/2	- 1/2	- 1/2	- 1/2	- 1/2	1/2	- 1/2	1/6	1/2	−0.29	− 1/2	0	− 1/6	− 2/3		
Anti- $c_R^{\wedge g}$	- 1/2	1/2	- 1/2	- 1/2	1/2	- 1/2	1/2	- 1/2	1/6	1/2	−0.29	− 1/2	0	− 1/6	− 2/3		
Anti- $c_R^{\vee g}$	- 1/2	- 1/2	- 1/2	- 1/2	- 1/2	1/2	- 1/2	- 1/2	1/6	− 1/2	−0.29	− 1/2	0	− 1/6	− 2/3		
Anti- $c_R^{\wedge b}$	- 1/2	1/2	- 1/2	- 1/2	1/2	- 1/2	- 1/2	1/2	1/6	0	0.58	− 1/2	0	− 1/6	− 2/3		

Anti-c _R ^{∨b}	- 1/2	- 1/2	- 1/2	- 1/2	- 1/2	- 1/2	- 1/2	1/2	1/6	0	0.58	- 1/2	0	- 1/6	- 2/3		
Anti-s _R ^{^r}	- 1/2	1/2	1/2	1/2	1/2	1/2	- 1/2	- 1/2	1/6	- 1/2	-0.29	1/2	0	- 1/6	1/3		
Anti-s _R ^{∨r}	- 1/2	- 1/2	1/2	1/2	- 1/2	- 1/2	1/2	- 1/2	1/6	1/2	-0.29	1/2	0	- 1/6	1/3		
Anti-s _R ^{^g}	- 1/2	1/2	1/2	1/2	1/2	- 1/2	1/2	- 1/2	1/6	1/2	-0.29	1/2	0	- 1/6	1/3		
Anti-s _R ^{∨g}	- 1/2	- 1/2	1/2	1/2	- 1/2	1/2	- 1/2	- 1/2	1/6	- 1/2	-0.29	1/2	0	- 1/6	1/3		
Anti-s _R ^{^b}	- 1/2	1/2	1/2	1/2	1/2	- 1/2	- 1/2	1/2	1/6	0	0.58	1/2	0	- 1/6	1/3		
Anti-s _R ^{∨b}	- 1/2	- 1/2	1/2	1/2	- 1/2	- 1/2	- 1/2	1/2	1/6	0	0.58	1/2	0	- 1/6	1/3		
<i>Quarks</i>																	
E8	1/2i*ω _T ³	½ ω _S ³	U ³	V ³	w	x	y	z	B ₂ *	g3	g ⁸	W ³	B ₁ ³	½Y	Q	Start	Result
									sqrt(2/3)								
t _L ^{^R}				1		-1			1/3	1/2	0.29	1/2	1/2	1/6	2/3	Anti-v _{eL} [^]	u _L ^{^R}
t _L ^{^G}				1			-1		1/3	- 1/2	0.29	1/2	1/2	1/6	2/3	Anti-v _{eL} [^]	u _L ^{^G}
t _L ^{^B}				1				-1	1/3	0	-0.58	1/2	1/2	1/6	2/3	Anti-v _{eL} [^]	u _L ^{^B}
<i>added lepton</i>									- 1/2				- 1/2				
t _L ^{∨R}			1				-1		1/3	- 1/2	0.29	1/2	- 1/2	- 5/6	- 1/3	Anti-e _L [∨]	u _L ^{∨R}
t _L ^{∨G}			1			-1			1/3	1/2	0.29	1/2	- 1/2	- 5/6	- 1/3	Anti-e _L [∨]	u _L ^{∨G}
t _L ^{∨B}			1					-1	1/3	0	-0.58	1/2	- 1/2	- 5/6	- 1/3	Anti-e _L [∨]	u _L ^{∨B}
<i>added lepton</i>									- 1/2				1/2	1	1		
b _L ^{^R}			-1			-1			1/3	1/2	0.29	- 1/2	1/2	1/6	- 1/3	Anti-v _{eL} [^]	d _L ^{^R}
b _L ^{^G}			-1				-1		1/3	- 1/2	0.29	- 1/2	1/2	1/6	- 1/3	Anti-v _{eL} [^]	d _L ^{^G}
b _L ^{^B}			-1					-1	1/3	0	-0.58	- 1/2	1/2	1/6	- 1/3	Anti-v _{eL} [^]	d _L ^{^B}
<i>added lepton</i>									- 1/2				- 1/2				
b _L ^{∨R}				-1			-1		1/3	- 1/2	0.29	- 1/2	- 1/2	- 5/6	-1 1/3	Anti-e _L [∨]	d _L ^{∨R}
b _L ^{∨G}				-1		-1			1/3	1/2	0.29	- 1/2	- 1/2	- 5/6	-1 1/3	Anti-e _L [∨]	d _L ^{∨G}
b _L ^{∨B}				-1				-1	1/3	0	-0.58	- 1/2	- 1/2	- 5/6	-1 1/3	Anti-e _L [∨]	d _L ^{∨B}
<i>added lepton</i>									- 1/2				1/2	1	1		
t _R ^{^R}		1				-1			1/3	1/2	0.29	0	0	- 1/3	- 1/3	Anti-e _L [^]	u _R ^{^R}
t _R ^{^G}		1					-1		1/3	- 1/2	0.29	0	0	- 1/3	- 1/3	Anti-e _L [^]	u _R ^{^G}
t _R ^{^B}		1						-1	1/3	0	-0.58	0	0	- 1/3	- 1/3	Anti-e _L [^]	u _R ^{^B}
t _R ^{∨R}		-1					-1		1/3	- 1/2	0.29	0	0	- 1/3	- 1/3	Anti-e _L [∨]	u _R ^{∨R}
t _R ^{∨G}		-1				-1			1/3	1/2	0.29	0	0	- 1/3	- 1/3	Anti-e _L [∨]	u _R ^{∨G}
t _R ^{∨B}		-1						-1	1/3	0	-0.58	0	0	- 1/3	- 1/3	Anti-e _L [∨]	u _R ^{∨B}
<i>added lepton</i>									- 1/2				1/2	1	1		
b _R ^{^R}	1					-1			1/3	1/2	0.29	0	0	- 1/3	- 1/3	Anti-v _{μL} [^]	d _R ^{^R}
b _R ^{^G}	1						-1		1/3	- 1/2	0.29	0	0	- 1/3	- 1/3	Anti-v _{μL} [^]	d _R ^{^G}
b _R ^{^B}	1							-1	1/3	0	-0.58	0	0	- 1/3	- 1/3	Anti-v _{μL} [^]	d _R ^{^B}
b _R ^{∨R}	-1						-1		1/3	- 1/2	0.29	0	0	- 1/3	- 1/3	Anti-e _L [∨]	d _R ^{∨R}
b _R ^{∨G}	-1					-1			1/3	1/2	0.29	0	0	- 1/3	- 1/3	Anti-e _L [∨]	d _R ^{∨G}
b _R ^{∨B}	-1							-1	1/3	0	-0.58	0	0	- 1/3	- 1/3	Anti-e _L [∨]	d _R ^{∨B}

<i>added lepton</i>									<i>- 1/2</i>				<i>- 1/2</i>				
E8	$1/2i*\omega_T^3$	$1/2\omega_S^3$	U^3	V^3	w	x	y	z	B_2	g_3	g^8	W^3	B_1^3	$1/2Y$	Q	Start	Result
Anti- $t_L^{\wedge r}$		-1				1			<i>- 1/3</i>	$-1/2$	-0.29	0	0	<i>1/3</i>	<i>1/3</i>	e_R^{\wedge}	Anti- $u_L^{\wedge r}$
Anti- $t_L^{\wedge g}$		-1					1		<i>- 1/3</i>	$1/2$	-0.29	0	0	<i>1/3</i>	<i>1/3</i>	e_R^{\wedge}	Anti- $u_L^{\wedge g}$
Anti- $t_L^{\wedge b}$		-1						1	<i>- 1/3</i>	0	0.58	0	0	<i>1/3</i>	<i>1/3</i>	e_R^{\wedge}	Anti- $u_L^{\wedge b}$
Anti- $t_L^{\vee r}$		1					1		<i>- 1/3</i>	$1/2$	-0.29	0	0	<i>1/3</i>	<i>1/3</i>	e_R^{\vee}	Anti- $u_L^{\vee r}$
Anti- $t_L^{\vee g}$		1				1			<i>- 1/3</i>	$-1/2$	-0.29	0	0	<i>1/3</i>	<i>1/3</i>	e_R^{\vee}	Anti- $u_L^{\vee g}$
Anti- $t_L^{\vee b}$		1						1	<i>- 1/3</i>	0	0.58	0	0	<i>1/3</i>	<i>1/3</i>	e_R^{\vee}	Anti- $u_L^{\vee b}$
<i>added lepton</i>									<i>1/2</i>				<i>- 1/2</i>	<i>-1</i>	<i>-1</i>		
Anti- $b_L^{\wedge r}$	-1					1			<i>- 1/3</i>	$-1/2$	-0.29	0	0	<i>1/3</i>	<i>1/3</i>	ν_{eR}^{\wedge}	Anti- $s_L^{\wedge r}$
Anti- $b_L^{\wedge g}$	-1						1		<i>- 1/3</i>	$1/2$	-0.29	0	0	<i>1/3</i>	<i>1/3</i>	ν_{eR}^{\wedge}	Anti- $s_L^{\wedge g}$
Anti- $b_L^{\wedge b}$	-1							1	<i>- 1/3</i>	0	0.58	0	0	<i>1/3</i>	<i>1/3</i>	ν_{eR}^{\wedge}	Anti- $s_L^{\wedge b}$
Anti- $b_L^{\vee r}$	1						1		<i>- 1/3</i>	$1/2$	-0.29	0	0	<i>1/3</i>	<i>1/3</i>	$\nu_{\mu R}^{\vee}$	Anti- $d_L^{\vee r}$
Anti- $b_L^{\vee g}$	1					1			<i>- 1/3</i>	$-1/2$	-0.29	0	0	<i>1/3</i>	<i>1/3</i>	$\nu_{\mu R}^{\vee}$	Anti- $d_L^{\vee g}$
Anti- $b_L^{\vee b}$	1							1	<i>- 1/3</i>	0	0.58	0	0	<i>1/3</i>	<i>1/3</i>	$\nu_{\mu R}^{\vee}$	Anti- $d_L^{\vee b}$
<i>added lepton</i>									<i>1/2</i>				<i>1/2</i>				
Anti- $t_R^{\wedge r}$				-1		1			<i>- 1/3</i>	$-1/2$	-0.29	$-1/2$	<i>- 1/2</i>	$-1/6$	$-2/3$	ν_{eR}^{\wedge}	Anti- $u_R^{\wedge r}$
Anti- $t_R^{\wedge g}$				-1			1		<i>- 1/3</i>	$1/2$	-0.29	$-1/2$	<i>- 1/2</i>	$-1/6$	$-2/3$	ν_{eR}^{\wedge}	Anti- $u_R^{\wedge g}$
Anti- $t_R^{\wedge b}$				-1				1	<i>- 1/3</i>	0	0.58	$-1/2$	<i>- 1/2</i>	$-1/6$	$-2/3$	ν_{eR}^{\wedge}	Anti- $u_R^{\wedge b}$
<i>added lepton</i>									<i>1/2</i>				<i>1/2</i>				
Anti- $t_R^{\vee r}$			-1				1		<i>- 1/3</i>	$1/2$	-0.29	$-1/2$	<i>1/2</i>	<i>5/6</i>	<i>1/3</i>	e_R^{\vee}	Anti- $u_R^{\vee r}$
Anti- $t_R^{\vee g}$			-1			1			<i>- 1/3</i>	$-1/2$	-0.29	$-1/2$	<i>1/2</i>	<i>5/6</i>	<i>1/3</i>	e_R^{\vee}	Anti- $u_R^{\vee g}$
Anti- $t_R^{\vee b}$			-1					1	<i>- 1/3</i>	0	0.58	$-1/2$	<i>1/2</i>	<i>5/6</i>	<i>1/3</i>	e_R^{\vee}	Anti- $u_R^{\vee b}$
<i>added lepton</i>									<i>1/2</i>				<i>- 1/2</i>	<i>-1</i>	<i>-1</i>		
Anti- $b_R^{\wedge r}$			1				1		<i>- 1/3</i>	$1/2$	-0.29	$1/2$	<i>- 1/2</i>	$-1/6$	$1/3$	ν_{eR}^{\wedge}	Anti- $d_R^{\wedge r}$
Anti- $b_R^{\wedge g}$			1			1			<i>- 1/3</i>	$-1/2$	-0.29	$1/2$	<i>- 1/2</i>	$-1/6$	$1/3$	ν_{eR}^{\wedge}	Anti- $d_R^{\wedge g}$
Anti- $b_R^{\wedge b}$			1					1	<i>- 1/3</i>	0	0.58	$1/2$	<i>- 1/2</i>	$-1/6$	$1/3$	ν_{eR}^{\wedge}	Anti- $d_R^{\wedge b}$
<i>added lepton</i>									<i>1/2</i>				<i>1/2</i>				
Anti- $b_R^{\vee r}$				1			1		<i>- 1/3</i>	$1/2$	-0.29	$1/2$	<i>1/2</i>	<i>5/6</i>	<i>1 1/3</i>	e_R^{\vee}	Anti- $d_R^{\vee r}$
Anti- $b_R^{\vee g}$				1		1			<i>- 1/3</i>	$-1/2$	-0.29	$1/2$	<i>1/2</i>	<i>5/6</i>	<i>1 1/3</i>	e_R^{\vee}	Anti- $d_R^{\vee g}$
Anti- $b_R^{\vee b}$				1				1	<i>- 1/3</i>	0	0.58	$1/2$	<i>1/2</i>	<i>5/6</i>	<i>1 1/3</i>	e_R^{\vee}	Anti- $d_R^{\vee b}$
<i>added lepton</i>									<i>1/2</i>				<i>- 1/2</i>	<i>-1</i>	<i>-1</i>		
E8	$1/2i*\omega_T^3$	$1/2\omega_S^3$	U^3	V^3	w	$x(R)$	$y(G)$	$z(B)$	B_{2*}	g_3	g^8	W^3	B_1^3	$1/2Y$	Q		
<i>Gluons</i>									sqrt(2/3)								
g^{R-g}						-1	1			1	0.00	0	0	0	0		
g^{r-G}						1	-1			-1	0.00	0	0	0	0		
g^{R-b}						-1		1		$1/2$	0.87	0	0	0	0		
g^{r-B}						1		-1		$-1/2$	-0.87	0	0	0	0		

$\mathbf{g}^{\mathbf{g-B}}$							1	-1		1/2	-0.87	0	0	0	0		
$\mathbf{g}^{\mathbf{G-b}}$							-1	1		-1/2	0.87	0	0	0	0		
<i>New Fields</i>																	
$x_1.\Phi^{\mathbf{gb}}$					-1	-1			1/3	1/2	0.29	0	0	-1/3	-1/3		
$x_1.\Phi^{\mathbf{rb}}$					-1		-1	0	1/3	-1/2	0.29	0	0	-1/3	-1/3		
$x_1.\Phi^{\mathbf{gr}}$					-1			-1	1/3	0	-0.58	0	0	-1/3	-1/3		
$x_1.\Phi^{\mathbf{GB}}$					-1	1			-1/3	-1/2	-0.29	0	0	1/3	1/3		
$x_1.\Phi^{\mathbf{RB}}$					-1		1		-1/3	1/2	-0.29	0	0	1/3	1/3		
$x_1.\Phi^{\mathbf{RG}}$					-1			1	-1/3	0	0.58	0	0	1/3	1/3		
$x_2.\Phi^{\mathbf{gb}}$					1	-1			1/3	1/2	0.29	0	0	-1/3	-1/3		
$x_2.\Phi^{\mathbf{rb}}$					1		-1		1/3	-1/2	0.29	0	0	-1/3	-1/3		
$x_2.\Phi^{\mathbf{rg}}$					1			-1	1/3	0	-0.58	0	0	-1/3	-1/3		
$x_2.\Phi^{\mathbf{BG}}$					1	1			-1/3	-1/2	-0.29	0	0	1/3	1/3		
$x_2.\Phi^{\mathbf{RB}}$					1		1		-1/3	1/2	-0.29	0	0	1/3	1/3		
$x_2.\Phi^{\mathbf{RG}}$					1			1	-1/3	0	0.58	0	0	1/3	1/3		
$x_3.\Phi^{\mathbf{RG}}$					0	-1	-1		2/3	0	0.58	0	0	-2/3	-2/3		
$x_3.\Phi^{\mathbf{GB}}$					0		-1	-1	2/3	-1/2	-0.29	0	0	-2/3	-2/3		
$x_3.\Phi^{\mathbf{RB}}$					0	-1		-1	2/3	1/2	-0.29	0	0	-2/3	-2/3		
$x_3.\Phi^{\mathbf{rg}}$					0	1	1		-2/3	0	-0.58	0	0	2/3	2/3		
$x_3.\Phi^{\mathbf{gb}}$					0		1	1	-2/3	1/2	0.29	0	0	2/3	2/3		
$x_3.\Phi^{\mathbf{rb}}$					0	1		1	-2/3	-1/2	0.29	0	0	2/3	2/3		