

Fundamental Bosons (part of the 112 E8 roots, 14 in total, real physical states)

E8	1/2i*ω _T ³	½ ω _S ³	U ³	V ³	w	x (R)	y (G)	z (B)	B ₂ *	g ³	g ⁸	W ³	B ₁ ³	½Y	Q	Block-1	Block-2	Block-3	E8-root
									sqrt(2/3)										(112 "1" roots)
Gravitational sector																			
ω _L [^]	1	1							0	0	0	0	0	0	0	e _{S+} [^]	e _{T-} [^]	<u>1</u>	Yes
ω _L [∨]	-1	-1							0	0	0	0	0	0	0	e _{S+} [∨]	e _{T-} [∨]	<u>1</u>	Yes
ω _R [^]	-1	1							0	0	0	0	0	0	0	e _{S+} [^]	e _{T-} [∨]	<u>1</u>	Yes
ω _R [∨]	1	-1							0	0	0	0	0	0	0	e _{S+} [∨]	e _{T-} [^]	<u>1</u>	Yes
																(degeneracy of two)			
Electroweak sector																			
W ⁺			1	1					0	0	0	1	0	0	1	φ ₊₊	φ ₁₋	<u>1</u>	Yes
W ⁻			-1	-1					0	0	0	-1	0	0	-1	φ ₋₊	φ ₀₋	<u>1</u>	Yes
B ₁ ⁺			-1	1					0	0	0	0	1	1	1	φ ₊₊	φ ₀₋	<u>1</u>	Yes
B ₁ ⁻			1	-1					0	0	0	0	-1	-1	-1	φ ₋₊	φ ₁₋	<u>1</u>	Yes
																(degeneracy of two)			
Strong sector (gluons)																			
g ^{R-g}						-1	1		0	1	0.00	0	0	0	0	<u>1</u>	q ₋ ^R	q ₊ ^g	Yes
g ^{r-G}						1	-1		0	-1	0.00	0	0	0	0	<u>1</u>	q ₋ ^r	q ₊ ^G	Yes
g ^{R-b}						-1		1	0	1/2	0.87	0	0	0	0	<u>1</u>	q ₋ ^R	q ₊ ^b	Yes
g ^{r-B}						1		-1	0	-1/2	-0.87	0	0	0	0	<u>1</u>	q ₋ ^r	q ₊ ^B	Yes
g ^{g-B}							1	-1	0	1/2	-0.87	0	0	0	0	<u>1</u>	q ₋ ^g	q ₊ ^B	Yes
g ^{G-b}							-1	1	0	-1/2	0.87	0	0	0	0	<u>1</u>	q ₋ ^G	q ₊ ^b	Yes
																(degeneracy of four)			

Fundamental "Building blocks" for particles

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	Block-1	Block-2	Block-3	E8-root
Gravitational sector									$\text{sqrt}(2/3)$										(112 "1" roots)
Frame																			
e_{S+}^{\wedge}		1			1				0	0	0	0	0	0	0	e_{S+}^{\wedge}			Yes
e_{S-}^{\wedge}		1			-1				0	0	0	0	0	0	0	e_{S-}^{\wedge}			Yes
e_{S+}^{\vee}		-1			1				0	0	0	0	0	0	0	e_{S+}^{\vee}			Yes
e_{S-}^{\vee}		-1			-1				0	0	0	0	0	0	0	e_{S-}^{\vee}			Yes
e_{T+}^{\wedge}	1				1				0	0	0	0	0	0	0	e_{T+}^{\wedge}			Yes
e_{T-}^{\wedge}	1				-1				0	0	0	0	0	0	0	e_{T-}^{\wedge}			Yes
e_{T+}^{\vee}	-1				1				0	0	0	0	0	0	0	e_{T+}^{\vee}			Yes
e_{T-}^{\vee}	-1				-1				0	0	0	0	0	0	0	e_{T-}^{\vee}			Yes
Fermions																			
f_{G-L}^{\wedge}	1/2	1/2							0	0	0	0	0	0	0	f_{G-L}^{\wedge}			Yes
f_{G-L}^{\vee}	- 1/2	- 1/2							0	0	0	0	0	0	0	f_{G-L}^{\vee}			Yes
f_{G-R}^{\wedge}	- 1/2	1/2							0	0	0	0	0	0	0	f_{G-R}^{\wedge}			Yes
f_{G-R}^{\vee}	1/2	- 1/2							0	0	0	0	0	0	0	f_{G-R}^{\vee}			Yes
Electroweak sector (Higgs)																			
ϕ_{++}				1	1				0	0	0	1/2	1/2	1/2	1		ϕ_{++}		Yes
ϕ_{+-}				1	-1				0	0	0	1/2	1/2	1/2	1		ϕ_{+-}		Yes
ϕ_{-+}				-1	1				0	0	0	- 1/2	- 1/2	- 1/2	-1		ϕ_{-+}		Yes
ϕ_{--}				-1	-1				0	0	0	- 1/2	- 1/2	- 1/2	-1		ϕ_{--}		Yes
ϕ_{0+}			-1		1				0	0	0	- 1/2	1/2	1/2	0		ϕ_{0+}		Yes
ϕ_{0-}			-1		-1				0	0	0	- 1/2	1/2	1/2	0		ϕ_{0-}		Yes
ϕ_{1+}			1		1				0	0	0	1/2	- 1/2	- 1/2	0		ϕ_{1+}		Yes
ϕ_{1-}			1		-1				0	0	0	1/2	- 1/2	- 1/2	0		ϕ_{1-}		Yes
Fermions																			
f_{L+}			1/2	1/2					0	0	0	1/2	0	0	1/2		f_{L+}		Yes
f_{L-}			- 1/2	- 1/2					0	0	0	- 1/2	0	0	- 1/2		f_{L-}		Yes
f_{R+}			- 1/2	1/2					0	0	0	0	1/2	1/2	1/2		f_{R+}		Yes
f_{R-}			1/2	- 1/2					0	0	0	0	- 1/2	- 1/2	- 1/2		f_{R-}		Yes

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	Block-1	Block-2	Block-3	E8-root
Strong sector																			
$x_1.\Phi^R$					-1	-1			1/3	1/2	0.29	0	0	- 1/3	- 1/3			q_{II}^R	Yes
$x_1.\Phi^G$					-1		-1	0	1/3	- 1/2	0.29	0	0	- 1/3	- 1/3			q_{II}^G	Yes
$x_1.\Phi^B$					-1			-1	1/3	0	-0.58	0	0	- 1/3	- 1/3			q_{II}^B	Yes
$x_1.\Phi^r$					-1	1			- 1/3	- 1/2	-0.29	0	0	1/3	1/3			q_{II}^r	Yes
$x_1.\Phi^g$					-1		1		- 1/3	1/2	-0.29	0	0	1/3	1/3			q_{II}^g	Yes
$x_1.\Phi^b$					-1			1	- 1/3	0	0.58	0	0	1/3	1/3			q_{II}^b	Yes
$x_2.\Phi^R$					1	-1			1/3	1/2	0.29	0	0	- 1/3	- 1/3			q_{II}^R	Yes
$x_2.\Phi^G$					1		-1		1/3	- 1/2	0.29	0	0	- 1/3	- 1/3			q_{II}^G	Yes
$x_2.\Phi^B$					1			-1	1/3	0	-0.58	0	0	- 1/3	- 1/3			q_{II}^B	Yes
$x_2.\Phi^r$					1	1			- 1/3	- 1/2	-0.29	0	0	1/3	1/3			q_{II}^r	Yes
$x_2.\Phi^g$					1		1		- 1/3	1/2	-0.29	0	0	1/3	1/3			q_{II}^g	Yes
$x_2.\Phi^b$					1			1	- 1/3	0	0.58	0	0	1/3	1/3			q_{II}^b	Yes
$x_3.\Phi^r$					0		-1	-1	2/3	- 1/2	-0.29	0	0	- 2/3	- 2/3			q_{III}^r	Yes
$x_3.\Phi^g$					0	-1		-1	2/3	1/2	-0.29	0	0	- 2/3	- 2/3			q_{III}^g	Yes
$x_3.\Phi^b$					0	-1	-1		2/3	0	0.58	0	0	- 2/3	- 2/3			q_{III}^b	Yes
$x_3.\Phi^R$					0		1	1	- 2/3	1/2	0.29	0	0	2/3	2/3			q_{III}^R	Yes
$x_3.\Phi^G$					0	1		1	- 2/3	- 1/2	0.29	0	0	2/3	2/3			q_{III}^G	Yes
$x_3.\Phi^B$					0	1	1		- 2/3	0	-0.58	0	0	2/3	2/3			q_{III}^B	Yes
Large R is color, small r is anti-color																			
q_I^R						- 1/2	1/2	1/2	- 1/6	1/2	0.29	0	0	1/6	1/6			q_I^R	No
q_I^G						1/2	- 1/2	1/2	- 1/6	- 1/2	0.29	0	0	1/6	1/6			q_I^G	No
q_I^B						1/2	1/2	- 1/2	- 1/6	0	-0.58	0	0	1/6	1/6			q_I^B	No
anti- q_I^r						1/2	- 1/2	- 1/2	1/6	- 1/2	-0.29	0	0	- 1/6	- 1/6			q_I^r	No
anti- q_I^g						- 1/2	1/2	- 1/2	1/6	1/2	-0.29	0	0	- 1/6	- 1/6			q_I^g	No
anti- q_I^b						- 1/2	- 1/2	1/2	1/6	0	0.58	0	0	- 1/6	- 1/6			q_I^b	No
L						- 1/2	- 1/2	- 1/2	1/2	0	0.00	0	0	- 1/2	- 1/2			L	No
anti-L						1/2	1/2	1/2	- 1/2	0	0.00	0	0	1/2	1/2			anti-L	No

Particle building, real physical states																			
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	Block-1	Block-2	Block-3	E8-root
Frame-Higgs (not part of the 112 E8 roots, 16 in total)																			
$e_S^+ \phi_+$	0	-1	0	1	0	0	0	0	0	0	0	1/2	1/2	1/2	1	e_{S+}^+	ϕ_{+-}	<u>1</u>	Yes
$e_S^- \phi_+$	0	1	0	1	0	0	0	0	0	0	0	1/2	1/2	1/2	1	e_{S+}^-	ϕ_{+-}	<u>1</u>	Yes
$e_S^+ \phi_-$	0	1	0	-1	0	0	0	0	0	0	0	- 1/2	- 1/2	- 1/2	-1	e_{S+}^+	ϕ_{--}	<u>1</u>	Yes
$e_S^- \phi_-$	0	-1	0	-1	0	0	0	0	0	0	0	- 1/2	- 1/2	- 1/2	-1	e_{S+}^-	ϕ_{--}	<u>1</u>	Yes
$e_S^+ \phi_0$	0	1	1	0	0	0	0	0	0	0	0	1/2	- 1/2	- 1/2	0	e_{S+}^+	ϕ_{0-}	<u>1</u>	Yes
$e_S^- \phi_0$	0	-1	1	0	0	0	0	0	0	0	0	1/2	- 1/2	- 1/2	0	e_{S+}^-	ϕ_{0-}	<u>1</u>	Yes
$e_S^+ \phi_1$	0	1	-1	0	0	0	0	0	0	0	0	- 1/2	1/2	1/2	0	e_{S+}^+	ϕ_{1-}	<u>1</u>	Yes
$e_S^- \phi_1$	0	-1	-1	0	0	0	0	0	0	0	0	- 1/2	1/2	1/2	0	e_{S+}^-	ϕ_{1-}	<u>1</u>	Yes
$e_T^+ \phi_+$	-1	0	0	1	0	0	0	0	0	0	0	1/2	1/2	1/2	1	e_{T+}^+	ϕ_{+-}	<u>1</u>	Yes
$e_T^- \phi_+$	1	0	0	1	0	0	0	0	0	0	0	1/2	1/2	1/2	1	e_{T+}^-	ϕ_{+-}	<u>1</u>	Yes
$e_T^+ \phi_-$	1	0	0	-1	0	0	0	0	0	0	0	- 1/2	- 1/2	- 1/2	-1	e_{T+}^+	ϕ_{--}	<u>1</u>	Yes
$e_T^- \phi_-$	-1	0	0	-1	0	0	0	0	0	0	0	- 1/2	- 1/2	- 1/2	-1	e_{T+}^-	ϕ_{--}	<u>1</u>	Yes
$e_T^+ \phi_0$	1	0	1	0	0	0	0	0	0	0	0	1/2	- 1/2	- 1/2	0	e_{T+}^+	ϕ_{0-}	<u>1</u>	Yes
$e_T^- \phi_0$	-1	0	1	0	0	0	0	0	0	0	0	1/2	- 1/2	- 1/2	0	e_{T+}^-	ϕ_{0-}	<u>1</u>	Yes
$e_T^+ \phi_1$	1	0	-1	0	0	0	0	0	0	0	0	- 1/2	1/2	1/2	0	e_{T+}^+	ϕ_{1-}	<u>1</u>	Yes
$e_T^- \phi_1$	-1	0	-1	0	0	0	0	0	0	0	0	- 1/2	1/2	1/2	0	e_{T+}^-	ϕ_{1-}	<u>1</u>	Yes
(degeneracy of two)																			
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	Block-1	Block-2	Block-3	E8-root
G1: Leptons									sqrt(2/3)										
ν_{eL}^+	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	f_{G-L}^+	f_{L+}	L	Yes
ν_{eL}^-	- 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	f_{G-L}^-	f_{L+}	L	Yes
ν_{eR}^+	- 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	f_{G-R}^+	f_{R+}	L	Yes
ν_{eR}^-	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	f_{G-R}^-	f_{R+}	L	Yes
e_L^+	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	f_{G-L}^+	f_{L-}	L	Yes
e_L^-	- 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	f_{G-L}^-	f_{L-}	L	Yes
e_R^+	- 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	f_{G-R}^+	f_{R-}	L	Yes
e_R^-	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	f_{G-R}^-	f_{R-}	L	Yes

<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	f_{G-L}^{\wedge}	f_{R-}	anti-L	Yes
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	f_{G-L}^{\vee}	f_{R-}	anti-L	Yes
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	f_{G-R}^{\wedge}	f_{L-}	anti-L	Yes
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	f_{G-R}^{\vee}	f_{L-}	anti-L	Yes
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	f_{G-L}^{\wedge}	f_{R+}	anti-L	Yes
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	f_{G-L}^{\vee}	f_{R+}	anti-L	Yes
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	f_{G-R}^{\wedge}	f_{L+}	anti-L	Yes
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	f_{G-R}^{\vee}	f_{L+}	anti-L	Yes
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	Block-1	Block-2	Block-3	E8-root
<u>G2: Leptons</u>																			
$\nu_{\mu L}^{\wedge}$	- 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	f_{G-R}^{\wedge}	f_{L+}	L	Yes
$\nu_{\mu L}^{\vee}$	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	f_{G-R}^{\vee}	f_{L+}	L	Yes
$\nu_{\mu R}^{\wedge}$	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	f_{G-L}^{\wedge}	f_{R+}	L	Yes
$\nu_{\mu R}^{\vee}$	- 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	f_{G-L}^{\vee}	f_{R+}	L	Yes
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	f_{G-R}^{\wedge}	f_{L-}	L	Yes
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	f_{G-R}^{\vee}	f_{L-}	L	Yes
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	f_{G-L}^{\wedge}	f_{R-}	L	Yes
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	f_{G-L}^{\vee}	f_{R-}	L	Yes
Red particles should be checked on frame (other coordinate system?)																			
<u>G2: Anti-leptons</u>																			
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	f_{G-R}^{\wedge}	f_{R-}	anti-L	Yes
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	f_{G-R}^{\vee}	f_{R-}	anti-L	Yes
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	f_{G-L}^{\wedge}	f_{L-}	anti-L	Yes
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	f_{G-L}^{\vee}	f_{L-}	anti-L	Yes
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	f_{G-R}^{\wedge}	f_{R+}	anti-L	Yes
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	f_{G-R}^{\vee}	f_{R+}	anti-L	Yes
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	f_{G-L}^{\wedge}	f_{L+}	anti-L	Yes
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	f_{G-L}^{\vee}	f_{L+}	anti-L	Yes

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	Block-1	Block-2	Block-3	E8-root
<u>G3: Root Leptons</u>									sqrt(2/3)										
$\nu_{\tau L}^{\wedge}$			1		1				0	0	0	1/2	- 1/2	- 1/2	0		ϕ_{0-}	<u>1</u>	Yes
$\nu_{\tau L}^{\vee}$			1		1				0	0	0	1/2	- 1/2	- 1/2	0		ϕ_{0-}	<u>1</u>	Yes
$\nu_{\tau R}^{\wedge}$	-1	1							0	0	0	0	0	0	0	e_{S+}^{\wedge}	e_{T-}^{\vee}	<u>1</u>	Yes
$\nu_{\tau R}^{\vee}$	1	-1							0	0	0	0	0	0	0	e_{S+}^{\vee}	e_{T-}^{\wedge}	<u>1</u>	Yes
τ_L^{\wedge}				-1	1				0	0	0	- 1/2	- 1/2	- 1/2	-1		ϕ_{--}	<u>1</u>	Yes
τ_L^{\vee}				-1	1				0	0	0	- 1/2	- 1/2	- 1/2	-1		ϕ_{--}	<u>1</u>	Yes
τ_R^{\wedge}			1	-1					0	0	0	0	-1	-1	-1	ϕ_{-+}	ϕ_{1-}	<u>1</u>	Yes
τ_R^{\vee}			1	-1					0	0	0	0	-1	-1	-1	ϕ_{-+}	ϕ_{1-}	<u>1</u>	Yes
Anti- $\nu_{\tau L}^{\wedge}$	-1	1							0	0	0	0	0	0	0	e_{S+}^{\wedge}	e_{T-}^{\vee}	<u>1</u>	Yes
Anti- $\nu_{\tau L}^{\vee}$	1	-1							0	0	0	0	0	0	0	e_{S+}^{\vee}	e_{T-}^{\wedge}	<u>1</u>	Yes
Anti- $\nu_{\tau R}^{\wedge}$	-1		-1						0	0	0	- 1/2	1/2	1/2	0	e_{T+}^{\vee}	ϕ_{1-}	<u>1</u>	Yes
Anti- $\nu_{\tau R}^{\vee}$	1		-1						0	0	0	- 1/2	1/2	1/2	0	e_{T+}^{\wedge}	ϕ_{1-}	<u>1</u>	Yes
Anti- τ_L^{\wedge}			-1	1					0	0	0	0	1	1	1	ϕ_{++}	ϕ_{0-}	<u>1</u>	Yes
Anti- τ_L^{\vee}			-1	1					0	0	0	0	1	1	1	ϕ_{++}	ϕ_{0-}	<u>1</u>	Yes
Anti- τ_R^{\wedge}	-1			1					0	0	0	1/2	1/2	1/2	1	e_{T+}^{\wedge}	ϕ_{+-}	<u>1</u>	Yes
Anti- τ_R^{\vee}	1			1					0	0	0	1/2	1/2	1/2	1	e_{T+}^{\vee}	ϕ_{+-}	<u>1</u>	Yes
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	Block-1	Block-2	Block-3	E8-root
<u>Quarks</u>									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	f_{G-L}^{\wedge}	f_{L+}	q_I^R	Yes
$u_L^{\wedge G}$	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	f_{G-L}^{\wedge}	f_{L+}	q_I^G	Yes
$u_L^{\wedge B}$	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	f_{G-L}^{\wedge}	f_{L+}	q_I^B	Yes
$u_L^{\vee R}$	- 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	f_{G-L}^{\vee}	f_{L+}	q_I^R	Yes
$u_L^{\vee G}$	- 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	f_{G-L}^{\vee}	f_{L+}	q_I^G	Yes
$u_L^{\vee B}$	- 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	f_{G-L}^{\vee}	f_{L+}	q_I^B	Yes

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	Block-1	Block-2	Block-3	E8-root
$d_L^{\wedge R}$	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	f_{G-L}^{\wedge}	f_{L-}	q_I^R	Yes
$d_L^{\wedge G}$	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	f_{G-L}^{\wedge}	f_{L-}	q_I^G	Yes
$d_L^{\wedge B}$	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	f_{G-L}^{\wedge}	f_{L-}	q_I^B	Yes
$d_L^{\vee R}$	- 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	f_{G-L}^{\vee}	f_{L-}	q_I^R	Yes
$d_L^{\vee G}$	- 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	f_{G-L}^{\vee}	f_{L-}	q_I^G	Yes
$d_L^{\vee B}$	- 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	f_{G-L}^{\vee}	f_{L-}	q_I^B	Yes
$u_R^{\wedge R}$	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	f_{G-L}^{\wedge}	f_{R+}	q_I^R	Yes
$u_R^{\wedge G}$	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	f_{G-L}^{\wedge}	f_{R+}	q_I^G	Yes
$u_R^{\wedge B}$	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	f_{G-L}^{\wedge}	f_{R+}	q_I^B	Yes
$u_R^{\vee R}$	- 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	f_{G-L}^{\vee}	f_{R+}	q_I^R	Yes
$u_R^{\vee G}$	- 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	f_{G-L}^{\vee}	f_{R+}	q_I^G	Yes
$u_R^{\vee B}$	- 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	f_{G-L}^{\vee}	f_{R+}	q_I^B	Yes
$d_R^{\wedge R}$	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	f_{G-L}^{\wedge}	f_{R-}	q_I^R	Yes
$d_R^{\wedge G}$	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	f_{G-L}^{\wedge}	f_{R-}	q_I^G	Yes
$d_R^{\wedge B}$	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	f_{G-L}^{\wedge}	f_{R-}	q_I^B	Yes
$d_R^{\vee R}$	- 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	f_{G-L}^{\vee}	f_{R-}	q_I^R	Yes
$d_R^{\vee G}$	- 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	f_{G-L}^{\vee}	f_{R-}	q_I^G	Yes
$d_R^{\vee B}$	- 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	f_{G-L}^{\vee}	f_{R-}	q_I^B	Yes
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	Block-1	Block-2	Block-3	E8-root
Quarks									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	- 1/2	0	- 1/6	- 2/3	f_{G-L}^{\wedge}	f_{L-}	q_I^r	Yes
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	- 1/2	0	- 1/6	- 2/3	f_{G-L}^{\wedge}	f_{L-}	q_I^g	Yes
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	- 1/2	0	- 1/6	- 2/3	f_{G-L}^{\wedge}	f_{L-}	q_I^b	Yes
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	- 1/2	0	- 1/6	- 2/3	f_{G-L}^{\vee}	f_{L-}	q_I^r	Yes
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	- 1/2	0	- 1/6	- 2/3	f_{G-L}^{\vee}	f_{L-}	q_I^g	Yes
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	- 1/2	0	- 1/6	- 2/3	f_{G-L}^{\vee}	f_{L-}	q_I^b	Yes

E8	1/2i*ω _T ³	½ ω _S ³	U ³	V ³	w	x	y	z	B _{2*}	g ₃	g ⁸	W ³	B ₁ ³	½Y	Q	Block-1	Block-2	Block-3	E8-root
Anti-d _L ^{^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	f _{G-L} [^]	f _{L+}	q _I ^r	Yes
Anti-d _L ^{^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	f _{G-L} [^]	f _{L+}	q _I ^g	Yes
Anti-d _L ^{^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	f _{G-L} [^]	f _{L+}	q _I ^b	Yes
Anti-d _L ^{∨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	f _{G-L} [∨]	f _{L+}	q _I ^r	Yes
Anti-d _L ^{∨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	f _{G-L} [∨]	f _{L+}	q _I ^g	Yes
Anti-d _L ^{∨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	f _{G-L} [∨]	f _{L+}	q _I ^b	Yes
Anti-u _R ^{^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	f _{G-L} [^]	f _{R-}	q _I ^r	Yes
Anti-u _R ^{^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	f _{G-L} [^]	f _{R-}	q _I ^g	Yes
Anti-u _R ^{^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	f _{G-L} [^]	f _{R-}	q _I ^b	Yes
Anti-u _R ^{∨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	f _{G-L} [∨]	f _{R-}	q _I ^r	Yes
Anti-u _R ^{∨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	f _{G-L} [∨]	f _{R-}	q _I ^g	Yes
Anti-u _R ^{∨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	f _{G-L} [∨]	f _{R-}	q _I ^b	Yes
Anti-d _R ^{^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	f _{G-L} [^]	f _{R+}	q _I ^r	Yes
Anti-d _R ^{^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	f _{G-L} [^]	f _{R+}	q _I ^g	Yes
Anti-d _R ^{^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	f _{G-L} [^]	f _{R+}	q _I ^b	Yes
Anti-d _R ^{∨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	f _{G-L} [∨]	f _{R+}	q _I ^r	Yes
Anti-d _R ^{∨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	f _{G-L} [∨]	f _{R+}	q _I ^g	Yes
Anti-d _R ^{∨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	f _{G-L} [∨]	f _{R+}	q _I ^b	Yes
E8	1/2i*ω _T ³	½ ω _S ³	U ³	V ³	w	x	y	z	B _{2*}	g ₃	g ⁸	W ³	B ₁ ³	½Y	Q	Block-1	Block-2	Block-3	E8-root
<i>Quarks</i>									sqrt(2/3)										
c _L ^{^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	f_{G-R}[^]	f _{L+}	q _I ^R	Yes
c _L ^{^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	f_{G-R}[^]	f _{L+}	q _I ^G	Yes
c _L ^{^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	f_{G-R}[^]	f _{L+}	q _I ^B	Yes
c _L ^{∨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	f_{G-R}[∨]	f _{L+}	q _I ^R	Yes
c _L ^{∨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	f_{G-R}[∨]	f _{L+}	q _I ^G	Yes

$c_L^{\vee B}$	$1/2$	$-1/2$	$1/2$	$1/2$	$1/2$	$1/2$	$1/2$	$-1/2$	$-1/6$	0	-0.58	$1/2$	0	$1/6$	$2/3$	f_{G-R}^{\vee}	f_{L+}	q_1^B	Yes
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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	Block-1	Block-2	Block-3	E8-root
$s_L^{\wedge R}$	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	f_{G-R}^{\vee}	f_{L-}	q_I^R	Yes
$s_L^{\wedge G}$	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	f_{G-R}^{\vee}	f_{L-}	q_I^G	Yes
$s_L^{\wedge B}$	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	f_{G-R}^{\vee}	f_{L-}	q_I^B	Yes
$s_L^{\vee R}$	- 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	f_{G-R}^{\wedge}	f_{L-}	q_I^R	Yes
$s_L^{\vee G}$	- 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	f_{G-R}^{\wedge}	f_{L-}	q_I^G	Yes
$s_L^{\vee B}$	- 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	f_{G-R}^{\wedge}	f_{L-}	q_I^B	Yes
$c_R^{\wedge R}$	- 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	f_{G-R}^{\wedge}	f_{R+}	q_I^R	Yes
$c_R^{\wedge G}$	- 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	f_{G-R}^{\wedge}	f_{R+}	q_I^G	Yes
$c_R^{\wedge B}$	- 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	f_{G-R}^{\wedge}	f_{R+}	q_I^B	Yes
$c_R^{\vee R}$	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	f_{G-R}^{\vee}	f_{R+}	q_I^R	Yes
$c_R^{\vee G}$	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	f_{G-R}^{\vee}	f_{R+}	q_I^G	Yes
$c_R^{\vee B}$	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	f_{G-R}^{\vee}	f_{R+}	q_I^B	Yes
$s_R^{\wedge R}$	- 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	f_{G-R}^{\wedge}	f_{R-}	q_I^R	Yes
$s_R^{\wedge G}$	- 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	f_{G-R}^{\wedge}	f_{R-}	q_I^G	Yes
$s_R^{\wedge B}$	- 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	f_{G-R}^{\wedge}	f_{R-}	q_I^B	Yes
$s_R^{\vee R}$	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	f_{G-R}^{\vee}	f_{R-}	q_I^R	Yes
$s_R^{\vee G}$	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	f_{G-R}^{\vee}	f_{R-}	q_I^G	Yes
$s_R^{\vee B}$	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	f_{G-R}^{\vee}	f_{R-}	q_I^B	Yes
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	Block-1	Block-2	Block-3	E8-root
<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	f_{G-R}^{\wedge}	f_{R-}	q_I^r	Yes
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	f_{G-R}^{\wedge}	f_{R-}	q_I^g	Yes
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	f_{G-R}^{\wedge}	f_{R-}	q_I^b	Yes
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	f_{G-R}^{\vee}	f_{R-}	q_I^r	Yes
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	f_{G-R}^{\vee}	f_{R-}	q_I^g	Yes
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	f_{G-R}^{\vee}	f_{R-}	q_I^b	Yes

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	Block-1	Block-2	Block-3	E8-root
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	f_{G-R}^{\wedge}	f_{R+}	q_I^r	Yes
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	f_{G-R}^{\wedge}	f_{R+}	q_I^g	Yes
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	f_{G-R}^{\wedge}	f_{R+}	q_I^b	Yes
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	f_{G-R}^{\vee}	f_{R+}	q_I^r	Yes
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	f_{G-R}^{\vee}	f_{R+}	q_I^g	Yes
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	f_{G-R}^{\vee}	f_{R+}	q_I^b	Yes
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	f_{G-R}^{\vee}	f_{L-}	q_I^r	Yes
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	f_{G-R}^{\vee}	f_{L-}	q_I^g	Yes
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	f_{G-R}^{\vee}	f_{L-}	q_I^b	Yes
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	f_{G-R}^{\wedge}	f_{L-}	q_I^r	Yes
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	f_{G-R}^{\wedge}	f_{L-}	q_I^g	Yes
Anti- $c_R^{\vee b}$	- 1/2	1/2	- 1/2	- 1/2	1/2	- 1/2	- 1/2	1/2	1/6	0	0.58	- 1/2	0	- 1/6	- 2/3	f_{G-R}^{\wedge}	f_{L-}	q_I^b	Yes
Anti- $s_R^{\wedge r}$	1/2	- 1/2	1/2	1/2	- 1/2	1/2	- 1/2	- 1/2	1/6	- 1/2	-0.29	1/2	0	- 1/6	1/3	f_{G-R}^{\vee}	f_{L+}	q_I^r	Yes
Anti- $s_R^{\wedge g}$	1/2	- 1/2	1/2	1/2	- 1/2	- 1/2	1/2	- 1/2	1/6	1/2	-0.29	1/2	0	- 1/6	1/3	f_{G-R}^{\vee}	f_{L+}	q_I^g	Yes
Anti- $s_R^{\wedge b}$	1/2	- 1/2	1/2	1/2	- 1/2	- 1/2	- 1/2	1/2	1/6	0	0.58	1/2	0	- 1/6	1/3	f_{G-R}^{\vee}	f_{L+}	q_I^b	Yes
Anti- $s_R^{\vee r}$	- 1/2	1/2	1/2	1/2	1/2	1/2	- 1/2	- 1/2	1/6	- 1/2	-0.29	1/2	0	- 1/6	1/3	f_{G-R}^{\wedge}	f_{L+}	q_I^r	Yes
Anti- $s_R^{\vee g}$	- 1/2	1/2	1/2	1/2	1/2	- 1/2	1/2	- 1/2	1/6	1/2	-0.29	1/2	0	- 1/6	1/3	f_{G-R}^{\wedge}	f_{L+}	q_I^g	Yes
Anti- $s_R^{\vee b}$	- 1/2	1/2	1/2	1/2	1/2	- 1/2	- 1/2	1/2	1/6	0	0.58	1/2	0	- 1/6	1/3	f_{G-R}^{\wedge}	f_{L+}	q_I^b	Yes
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	Block-1	Block-2	Block-3	E8-root
$t_L^{\wedge R}$				1		-1			sqrt(2/3)								ϕ_{++}	q_{II}^R	Yes
$t_L^{\wedge G}$				1			-1		1/3	- 1/2	0.29	1/2	1/2	1/6	2/3		ϕ_{++}	q_{II}^G	Yes
$t_L^{\wedge B}$				1				-1	1/3	0	-0.58	1/2	1/2	1/6	2/3		ϕ_{++}	q_{II}^B	Yes
<i>(degeneracy of two)</i>																			
$t_L^{\vee R}$			1		1		1	1	- 2/3	1/2	0.29	1/2	- 1/2	1/6	2/3		ϕ_{1+}	q_{III}^R	No
$t_L^{\vee G}$			1		1	1		1	- 2/3	- 1/2	0.29	1/2	- 1/2	1/6	2/3		ϕ_{1+}	q_{III}^G	No

$t_L^{\vee B}$			1		1	1	1		- 2/3	0	-0.58	1/2	- 1/2	1/6	2/3		ϕ_{I+}	q_{III}^B	No
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$b_L^{\wedge R}$			-1			-1			1/3	1/2	0.29	- 1/2	1/2	1/6	- 1/3		(degeneracy of two)		
$b_L^{\wedge G}$			-1				-1		1/3	- 1/2	0.29	- 1/2	1/2	1/6	- 1/3		ϕ_{0+}	$q_{ -}^R$	Yes
$b_L^{\wedge B}$			-1					-1	1/3	0	-0.58	- 1/2	1/2	1/6	- 1/3		ϕ_{0+}	$q_{ -}^G$	Yes
																	ϕ_{0+}	$q_{ -}^B$	Yes
$b_L^{\vee R}$				-1	1		1	1	- 2/3	1/2	0.29	- 1/2	- 1/2	1/6	- 1/3		(degeneracy of two)		
$b_L^{\vee G}$				-1	1	1		1	- 2/3	- 1/2	0.29	- 1/2	- 1/2	1/6	- 1/3		ϕ_{-+}	$q_{ }^R$	No
$b_L^{\vee B}$				-1	1	1	1		- 2/3	0	-0.58	- 1/2	- 1/2	1/6	- 1/3		ϕ_{-+}	$q_{ }^G$	No
																	ϕ_{-+}	$q_{ }^B$	No
$t_R^{\wedge R}$							1	1	- 2/3	1/2	0.29	0	0	2/3	2/3		(degeneracy of two)		
$t_R^{\wedge G}$						1		1	- 2/3	- 1/2	0.29	0	0	2/3	2/3			$q_{ }^R$	Yes
$t_R^{\wedge B}$						1	1		- 2/3	0	-0.58	0	0	2/3	2/3			$q_{ }^G$	Yes
																		$q_{ }^B$	Yes
$t_R^{\vee R}$							1	1	- 2/3	1/2	0.29	0	0	2/3	2/3			$q_{ }^R$	Yes
$t_R^{\vee G}$						1		1	- 2/3	- 1/2	0.29	0	0	2/3	2/3			$q_{ }^G$	Yes
$t_R^{\vee B}$						1	1		- 2/3	0	-0.58	0	0	2/3	2/3			$q_{ }^B$	Yes
$b_R^{\wedge R}$					1	-1			1/3	1/2	0.29	0	0	- 1/3	- 1/3			$q_{ +}^R$	Yes
$b_R^{\wedge G}$					1		-1		1/3	- 1/2	0.29	0	0	- 1/3	- 1/3			$q_{ +}^G$	Yes
$b_R^{\wedge B}$					1			-1	1/3	0	-0.58	0	0	- 1/3	- 1/3			$q_{ +}^B$	Yes
$b_R^{\vee R}$					-1	-1			1/3	1/2	0.29	0	0	- 1/3	- 1/3			$q_{ -}^R$	Yes
$b_R^{\vee G}$					-1		-1		1/3	- 1/2	0.29	0	0	- 1/3	- 1/3			$q_{ -}^G$	Yes
$b_R^{\vee B}$					-1			-1	1/3	0	-0.58	0	0	- 1/3	- 1/3			$q_{ -}^B$	Yes
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	Block-1	Block-2	Block-3	E8-root
Anti- $t_L^{\wedge r}$							-1	-1	2/3	- 1/2	-0.29	0	0	- 2/3	- 2/3			$q_{ }^r$	Yes
Anti- $t_L^{\wedge g}$						-1		-1	2/3	1/2	-0.29	0	0	- 2/3	- 2/3			$q_{ }^g$	Yes
Anti- $t_L^{\wedge b}$						-1	-1		2/3	0	0.58	0	0	- 2/3	- 2/3			$q_{ }^b$	Yes
Anti- $t_L^{\vee r}$							-1	-1	2/3	- 1/2	-0.29	0	0	- 2/3	- 2/3			$q_{ }^r$	Yes
Anti- $t_L^{\vee g}$						-1		-1	2/3	1/2	-0.29	0	0	- 2/3	- 2/3			$q_{ }^g$	Yes

Anti-t _L ^{ν b}						-1	-1		2/3	0	0.58	0	0	- 2/3	- 2/3			q _{III} ^b	Yes
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Anti-b _L ^{^r}					1	1			- 1/3	- 1/2	-0.29	0	0	1/3	1/3			q ₊ ^r	Yes
Anti-b _L ^{^g}					1		1		- 1/3	1/2	-0.29	0	0	1/3	1/3			q ₊ ^g	Yes
Anti-b _L ^{^b}					1			1	- 1/3	0	0.58	0	0	1/3	1/3			q ₊ ^b	Yes
Anti-b _L ^{^v r}					-1	1			- 1/3	- 1/2	-0.29	0	0	1/3	1/3			q ₋ ^r	Yes
Anti-b _L ^{^v g}					-1		1		- 1/3	1/2	-0.29	0	0	1/3	1/3			q ₋ ^g	Yes
Anti-b _L ^{^v b}					-1			1	- 1/3	0	0.58	0	0	1/3	1/3			q ₋ ^b	Yes
Anti-t _R ^{^r}			-1			1			- 1/3	- 1/2	-0.29	- 1/2	- 1/2	- 1/6	- 2/3		φ ₋₊	q ₋ ^r	Yes
Anti-t _R ^{^g}			-1				1		- 1/3	1/2	-0.29	- 1/2	- 1/2	- 1/6	- 2/3		φ ₋₊	q ₋ ^g	Yes
Anti-t _R ^{^b}			-1					1	- 1/3	0	0.58	- 1/2	- 1/2	- 1/6	- 2/3		φ ₋₊	q ₋ ^b	Yes
<i>(degeneracy of two)</i>																			
Anti-t _R ^{^v r}			-1		1		-1	-1	2/3	- 1/2	-0.29	- 1/2	1/2	- 1/6	- 2/3		φ ₀₊	q ^r	No
Anti-t _R ^{^v g}			-1		1	-1		-1	2/3	1/2	-0.29	- 1/2	1/2	- 1/6	- 2/3		φ ₀₊	q ^g	No
Anti-t _R ^{^v b}			-1		1		-1	-1	2/3	- 1/2	-0.29	- 1/2	1/2	- 1/6	- 2/3		φ ₀₊	q ^b	No
<i>(degeneracy of two)</i>																			
Anti-b _R ^{^r}			1			1			- 1/3	- 1/2	-0.29	1/2	- 1/2	- 1/6	1/3		φ ₁₊	q ₋ ^r	Yes
Anti-b _R ^{^g}			1				1		- 1/3	1/2	-0.29	1/2	- 1/2	- 1/6	1/3		φ ₁₊	q ₋ ^g	Yes
Anti-b _R ^{^b}			1					1	- 1/3	0	0.58	1/2	- 1/2	- 1/6	1/3		φ ₁₊	q ₋ ^b	Yes
<i>(degeneracy of two)</i>																			
Anti-b _R ^{^v r}				1	1		-1	-1	2/3	- 1/2	-0.29	1/2	1/2	- 1/6	1/3		φ ₊₊	q ^r	No
Anti-b _R ^{^v g}				1	1	-1		-1	2/3	1/2	-0.29	1/2	1/2	- 1/6	1/3		φ ₊₊	q ^g	No
Anti-b _R ^{^v b}				1	1		-1	-1	2/3	- 1/2	-0.29	1/2	1/2	- 1/6	1/3		φ ₊₊	q ^b	No
<i>(degeneracy of two)</i>																			
E8	1/2i*ω _T ³	1/2 ω _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	Block-1	Block-2	Block-3	E8-root