

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	ω _L	ω _R	E8-root
									sqrt(2/3)												(112 "1" roots)
<i>Gravitational sector</i>																					
ω _L [^]	1	1							0	0	0	0	0	0	0	e _{S+} [^]	e _{T-} [^]	<u>1</u>	2	0	Yes
ω _L [∨]	-1	-1							0	0	0	0	0	0	0	e _{S+} [∨]	e _{T-} [∨]	<u>1</u>	-2	0	Yes
ω _R [^]	-1	1							0	0	0	0	0	0	0	e _{S+} [^]	e _{T-} [∨]	<u>1</u>	0	2	Yes
ω _R [∨]	1	-1							0	0	0	0	0	0	0	e _{S+} [∨]	e _{T-} [^]	<u>1</u>	0	-2	Yes
																<i>(degeneracy of two)</i>					
<i>Electroweak sector</i>																					
W ⁺			1	1					0	0	0	1	0	0	1	φ ₊₊	φ ₁₋	<u>1</u>	0	0	Yes
W ⁻			-1	-1					0	0	0	-1	0	0	-1	φ ₋₊	φ ₀₋	<u>1</u>	0	0	Yes
B ₁ ⁺			-1	1					0	0	0	0	1	1	1	φ ₊₊	φ ₀₋	<u>1</u>	0	0	Yes
B ₁ ⁻			1	-1					0	0	0	0	-1	-1	-1	φ ₋₊	φ ₁₋	<u>1</u>	0	0	Yes
																<i>(degeneracy of two)</i>					
<i>Strong sector (gluons)</i>																					
g ^{R-g}						-1	1		0	1	0.00	0	0	0	0	<u>1</u>	q ₋ ^R	q ₊ ^g	0	0	Yes
g ^{r-G}						1	-1		0	-1	0.00	0	0	0	0	<u>1</u>	q ₋ ^r	q ₊ ^G	0	0	Yes
g ^{R-b}						-1		1	0	1/2	0.87	0	0	0	0	<u>1</u>	q ₋ ^R	q ₊ ^b	0	0	Yes
g ^{r-B}						1		-1	0	-1/2	-0.87	0	0	0	0	<u>1</u>	q ₋ ^r	q ₊ ^B	0	0	Yes
g ^{g-B}							1	-1	0	1/2	-0.87	0	0	0	0	<u>1</u>	q ₋ ^g	q ₊ ^B	0	0	Yes
g ^{G-b}							-1	1	0	-1/2	0.87	0	0	0	0	<u>1</u>	q ₋ ^G	q ₊ ^b	0	0	Yes
																<i>(degeneracy of four)</i>					

Fundamental "Building blocks" for particles

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	ω _L	ω _R	E8-root
Gravitational sector									sqrt(2/3)												(112 "1" roots)
Frame																					
e _{S+} [^]		1			1				0	0	0	0	0	0	0	e _{S+} [^]			1	1	Yes
e _{S-} [^]		1			-1				0	0	0	0	0	0	0	e _{S-} [^]			1	1	Yes
e _{S+} [∨]		-1			1				0	0	0	0	0	0	0	e _{S+} [∨]			-1	-1	Yes
e _{S-} [∨]		-1			-1				0	0	0	0	0	0	0	e _{S-} [∨]			-1	-1	Yes
e _{T+} [^]	1				1				0	0	0	0	0	0	0	e _{T+} [^]			1	-1	Yes
e _{T-} [^]	1				-1				0	0	0	0	0	0	0	e _{T-} [^]			1	-1	Yes
e _{T+} [∨]	-1				1				0	0	0	0	0	0	0	e _{T+} [∨]			-1	1	Yes

e_{T-}^{\vee}	-1				-1				0	0	0	0	0	0	0	e_{T-}^{\vee}			-1	1	Yes
Fermions																					
f_{G-L}^{\wedge}	1/2	1/2							0	0	0	0	0	0	0	f_{G-L}^{\wedge}			1	0	Yes
f_{G-L}^{\vee}	- 1/2	- 1/2							0	0	0	0	0	0	0	f_{G-L}^{\vee}			-1	0	Yes
f_{G-R}^{\wedge}	- 1/2	1/2							0	0	0	0	0	0	0	f_{G-R}^{\wedge}			0	1	Yes
f_{G-R}^{\vee}	1/2	- 1/2							0	0	0	0	0	0	0	f_{G-R}^{\vee}			0	-1	Yes
Electroweak sector (Higgs)																					
ϕ_{++}					1	1			0	0	0	1/2	1/2	1/2	1		ϕ_{++}		0	0	Yes
ϕ_{+-}					1	-1			0	0	0	1/2	1/2	1/2	1		ϕ_{+-}		0	0	Yes
ϕ_{-+}					-1	1			0	0	0	- 1/2	- 1/2	- 1/2	-1		ϕ_{-+}		0	0	Yes
ϕ_{--}					-1	-1			0	0	0	- 1/2	- 1/2	- 1/2	-1		ϕ_{--}		0	0	Yes
ϕ_{0+}			-1			1			0	0	0	- 1/2	1/2	1/2	0		ϕ_{0+}		0	0	Yes
ϕ_{0-}			-1			-1			0	0	0	- 1/2	1/2	1/2	0		ϕ_{0-}		0	0	Yes
ϕ_{1+}			1			1			0	0	0	1/2	- 1/2	- 1/2	0		ϕ_{1+}		0	0	Yes
ϕ_{1-}			1			-1			0	0	0	1/2	- 1/2	- 1/2	0		ϕ_{1-}		0	0	Yes
Fermions																					
f_{L+}			1/2	1/2					0	0	0	1/2	0	0	1/2		f_{L+}		0	0	Yes
f_{L-}			- 1/2	- 1/2					0	0	0	- 1/2	0	0	- 1/2		f_{L-}		0	0	Yes
f_{R+}			- 1/2	1/2					0	0	0	0	1/2	1/2	1/2		f_{R+}		0	0	Yes
f_{R-}			1/2	- 1/2					0	0	0	0	- 1/2	- 1/2	- 1/2		f_{R-}		0	0	Yes
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	Block-1	Block-2	Block-3	ω_L	ω_R	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	0	0	Yes
$x_1.\Phi^G$					-1		-1		1/3	- 1/2	0.29	0	0	- 1/3	- 1/3			q_{II-}^G	0	0	Yes
$x_1.\Phi^B$					-1			-1	1/3	0	-0.58	0	0	- 1/3	- 1/3			q_{II-}^B	0	0	Yes
$x_1.\Phi^r$					-1	1			- 1/3	- 1/2	-0.29	0	0	1/3	1/3			q_{II-}^r	0	0	Yes
$x_1.\Phi^g$					-1		1		- 1/3	1/2	-0.29	0	0	1/3	1/3			q_{II-}^g	0	0	Yes
$x_1.\Phi^b$					-1			1	- 1/3	0	0.58	0	0	1/3	1/3			q_{II-}^b	0	0	Yes
$x_2.\Phi^R$					1	-1			1/3	1/2	0.29	0	0	- 1/3	- 1/3			q_{II+}^R	0	0	Yes
$x_2.\Phi^G$					1		-1		1/3	- 1/2	0.29	0	0	- 1/3	- 1/3			q_{II+}^G	0	0	Yes
$x_2.\Phi^B$					1			-1	1/3	0	-0.58	0	0	- 1/3	- 1/3			q_{II+}^B	0	0	Yes
$x_2.\Phi^r$					1	1			- 1/3	- 1/2	-0.29	0	0	1/3	1/3			q_{II+}^r	0	0	Yes
$x_2.\Phi^g$					1		1		- 1/3	1/2	-0.29	0	0	1/3	1/3			q_{II+}^g	0	0	Yes
$x_2.\Phi^b$					1			1	- 1/3	0	0.58	0	0	1/3	1/3			q_{II+}^b	0	0	Yes
$x_3.\Phi^r$					0		-1	-1	2/3	- 1/2	-0.29	0	0	- 2/3	- 2/3			q_{III}^r	0	0	Yes
$x_3.\Phi^g$					0	-1		-1	2/3	1/2	-0.29	0	0	- 2/3	- 2/3			q_{III}^g	0	0	Yes

x_3, Φ^b					0	-1	-1		2/3	0	0.58	0	0	-2/3	-2/3			q_{III}^b	0	0	Yes
x_3, Φ^R					0		1	1	-2/3	1/2	0.29	0	0	2/3	2/3			q_{III}^R	0	0	Yes
x_3, Φ^G					0	1		1	-2/3	-1/2	0.29	0	0	2/3	2/3			q_{III}^G	0	0	Yes
x_3, Φ^B					0	1	1		-2/3	0	-0.58	0	0	2/3	2/3			q_{III}^B	0	0	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	0	0	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	0	0	No
q_I^B						1/2	1/2	-1/2	-1/6	0	-0.58	0	0	1/6	1/6			q_I^B	0	0	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	0	0	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	0	0	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	0	0	No
L						-1/2	-1/2	-1/2	1/2	0	0.00	0	0	-1/2	-1/2			L	0	0	No
anti-L						1/2	1/2	1/2	-1/2	0	0.00	0	0	1/2	1/2			anti-L	0	0	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	ω_L	ω_R	E8-root
Frame-Higgs (part of the 112 E8 roots, 16 in total)																					
$e_S^{\wedge}\phi_+$	0	-1	0	1	0	0	0	0	0	0	0	1/2	1/2	1/2	1	e_{S+}^{\wedge}	ϕ_{+-}	<u>1</u>	-1	-1	Yes
$e_S^{\vee}\phi_+$	0	1	0	1	0	0	0	0	0	0	0	1/2	1/2	1/2	1	e_{S+}^{\vee}	ϕ_{+-}	<u>1</u>	1	1	Yes
$e_S^{\wedge}\phi_-$	0	1	0	-1	0	0	0	0	0	0	0	-1/2	-1/2	-1/2	-1	e_{S+}^{\wedge}	ϕ_{--}	<u>1</u>	1	1	Yes
$e_S^{\vee}\phi_-$	0	-1	0	-1	0	0	0	0	0	0	0	-1/2	-1/2	-1/2	-1	e_{S+}^{\vee}	ϕ_{--}	<u>1</u>	-1	-1	Yes
$e_S^{\wedge}\phi_0$	0	1	1	0	0	0	0	0	0	0	0	1/2	-1/2	-1/2	0	e_{S+}^{\wedge}	ϕ_{0-}	<u>1</u>	1	1	Yes
$e_S^{\vee}\phi_0$	0	-1	1	0	0	0	0	0	0	0	0	1/2	-1/2	-1/2	0	e_{S+}^{\vee}	ϕ_{0-}	<u>1</u>	-1	-1	Yes
$e_S^{\wedge}\phi_1$	0	1	-1	0	0	0	0	0	0	0	0	-1/2	1/2	1/2	0	e_{S+}^{\wedge}	ϕ_{1-}	<u>1</u>	1	1	Yes
$e_S^{\vee}\phi_1$	0	-1	-1	0	0	0	0	0	0	0	0	-1/2	1/2	1/2	0	e_{S+}^{\vee}	ϕ_{1-}	<u>1</u>	-1	-1	Yes
$e_T^{\wedge}\phi_+$	-1	0	0	1	0	0	0	0	0	0	0	1/2	1/2	1/2	1	e_{T+}^{\wedge}	ϕ_{+-}	<u>1</u>	-1	1	Yes
$e_T^{\vee}\phi_+$	1	0	0	1	0	0	0	0	0	0	0	1/2	1/2	1/2	1	e_{T+}^{\vee}	ϕ_{+-}	<u>1</u>	1	-1	Yes
$e_T^{\wedge}\phi_-$	1	0	0	-1	0	0	0	0	0	0	0	-1/2	-1/2	-1/2	-1	e_{T+}^{\wedge}	ϕ_{--}	<u>1</u>	1	-1	Yes
$e_T^{\vee}\phi_-$	-1	0	0	-1	0	0	0	0	0	0	0	-1/2	-1/2	-1/2	-1	e_{T+}^{\vee}	ϕ_{--}	<u>1</u>	-1	1	Yes
$e_T^{\wedge}\phi_0$	1	0	1	0	0	0	0	0	0	0	0	1/2	-1/2	-1/2	0	e_{T+}^{\wedge}	ϕ_{0-}	<u>1</u>	1	-1	Yes
$e_T^{\vee}\phi_0$	-1	0	1	0	0	0	0	0	0	0	0	1/2	-1/2	-1/2	0	e_{T+}^{\vee}	ϕ_{0-}	<u>1</u>	-1	1	Yes
$e_T^{\wedge}\phi_1$	1	0	-1	0	0	0	0	0	0	0	0	-1/2	1/2	1/2	0	e_{T+}^{\wedge}	ϕ_{1-}	<u>1</u>	1	-1	Yes
$e_T^{\vee}\phi_1$	-1	0	-1	0	0	0	0	0	0	0	0	-1/2	1/2	1/2	0	e_{T+}^{\vee}	ϕ_{1-}	<u>1</u>	-1	1	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	ω_L	ω_R	E8-root
G1: Leptons									sqrt(2/3)												

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	f_{G-L}^{\wedge}	f_{L+}	L	1	0	Yes
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	f_{G-L}^{\vee}	f_{L+}	L	-1	0	Yes
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	f_{G-R}^{\wedge}	f_{R+}	L	0	1	Yes
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	f_{G-R}^{\vee}	f_{R+}	L	0	-1	Yes
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	f_{G-L}^{\wedge}	f_{L-}	L	1	0	Yes
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	f_{G-L}^{\vee}	f_{L-}	L	-1	0	Yes
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	f_{G-R}^{\wedge}	f_{R-}	L	0	1	Yes
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	f_{G-R}^{\vee}	f_{R-}	L	0	-1	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	1	0	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	-1	0	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	0	1	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	0	-1	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	1	0	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	-1	0	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	0	1	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	0	-1	Yes
E8	1/2i* ω_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	Block-1	Block-2	Block-3	ω_L	ω_R	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	0	1/2	0	0	f_{G-L}^{\wedge}	f_{R+}	L	1	0	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	0	1/2	0	0	f_{G-L}^{\vee}	f_{R+}	L	-1	0	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	1/2	0	-1/2	0	f_{G-R}^{\wedge}	f_{L+}	L	0	1	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	1/2	0	-1/2	0	f_{G-R}^{\vee}	f_{L+}	L	0	-1	Yes
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-L}^{\wedge}	f_{R-}	L	1	0	Yes
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-L}^{\vee}	f_{R-}	L	-1	0	Yes
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-R}^{\wedge}	f_{L-}	L	0	1	Yes
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-R}^{\vee}	f_{L-}	L	0	-1	Yes
<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	1/2	0	1/2	0	f_{G-L}^{\wedge}	f_{L-}	anti-L	1	0	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	1/2	0	1/2	0	f_{G-L}^{\vee}	f_{L-}	anti-L	-1	0	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	0	-1/2	0	0	f_{G-R}^{\wedge}	f_{R-}	anti-L	0	1	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	0	-1/2	0	0	f_{G-R}^{\vee}	f_{R-}	anti-L	0	-1	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	1/2	0	1/2	1	f_{G-L}^{\wedge}	f_{L+}	anti-L	1	0	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	1/2	0	1/2	1	f_{G-L}^\vee	f_{L+}	anti-L	-1	0	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	0	1/2	1	1	f_{G-R}^\wedge	f_{R+}	anti-L	0	1	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	0	1/2	1	1	f_{G-R}^\vee	f_{R+}	anti-L	0	-1	Yes
	E8	1/2i* ω_T^3	$\frac{1}{2} \omega_S^3$	U^3	V^3	w	x	y	z	B_{2*}	g3	g^8	W^3	B_1^3	$\frac{1}{2}Y$	Q	Block-1	Block-2	Block-3	ω_L	ω_R	E8-root
	<i>G3: Root Leptons (no physical states)</i>									sqrt(2/3)												
1	$\nu_{\tau T}^\wedge$	1		1						0	0	0	1/2	- 1/2	- 1/2	0	e_{T+}^\wedge	ϕ_{0-}	<u>1</u>	1	-1	Yes
2	$\nu_{\tau T}^\vee$	-1		1						0	0	0	1/2	- 1/2	- 1/2	0	e_{T+}^\vee	ϕ_{0-}	<u>1</u>	-1	1	Yes
3	$\nu_{\tau S}^\wedge$		1	1						0	0	0	1/2	- 1/2	- 1/2	0	e_{S+}^\wedge	ϕ_{0-}	<u>1</u>	1	1	Yes
4	$\nu_{\tau R}^\vee$		-1	1						0	0	0	1/2	- 1/2	- 1/2	0	e_{S+}^\vee	ϕ_{0-}	<u>1</u>	-1	-1	Yes
5	τ_T^\wedge	1			-1					0	0	0	- 1/2	- 1/2	- 1/2	-1	e_{T+}^\wedge	ϕ_{--}	<u>1</u>	1	-1	Yes
6	τ_T^\vee	-1			-1					0	0	0	- 1/2	- 1/2	- 1/2	-1	e_{T+}^\vee	ϕ_{--}	<u>1</u>	-1	1	Yes
7	τ_S^\wedge		1		-1					0	0	0	- 1/2	- 1/2	- 1/2	-1	e_{S+}^\wedge	ϕ_{--}	<u>1</u>	1	1	Yes
8	τ_S^\vee		-1		-1					0	0	0	- 1/2	- 1/2	- 1/2	-1	e_{S+}^\vee	ϕ_{--}	<u>1</u>	-1	-1	Yes
	Anti- $\nu_{\tau T}^\wedge$	1		-1						0	0	0	1/2	- 1/2	- 1/2	0	e_{T+}^\wedge	ϕ_{1-}	<u>1</u>	1	-1	Yes
	Anti- $\nu_{\tau T}^\vee$	-1		-1						0	0	0	1/2	- 1/2	- 1/2	0	e_{T+}^\vee	ϕ_{1-}	<u>1</u>	-1	1	Yes
	Anti- $\nu_{\tau S}^\wedge$		1	-1						0	0	0	1/2	- 1/2	- 1/2	0	e_{S+}^\wedge	ϕ_{1-}	<u>1</u>	1	1	Yes
	Anti- $\nu_{\tau S}^\vee$		-1	-1						0	0	0	1/2	- 1/2	- 1/2	0	e_{S+}^\vee	ϕ_{1-}	<u>1</u>	-1	-1	Yes
	Anti- τ_T^\wedge	1			1					0	0	0	1/2	1/2	1/2	1	e_{T+}^\wedge	ϕ_{+-}	<u>1</u>	1	-1	Yes
	Anti- τ_T^\vee	-1			1					0	0	0	1/2	1/2	1/2	1	e_{T+}^\vee	ϕ_{+-}	<u>1</u>	-1	1	Yes
	Anti- τ_R^\wedge		1		1					0	0	0	1/2	1/2	1/2	1	e_{S+}^\wedge	ϕ_{+-}	<u>1</u>	1	1	Yes
	Anti- τ_R^\vee		-1		1					0	0	0	1/2	1/2	1/2	1	e_{S+}^\vee	ϕ_{+-}	<u>1</u>	-1	-1	Yes
	E8	1/2i* ω_T^3	$\frac{1}{2} \omega_S^3$	U^3	V^3	w	x	y	z	B_{2*}	g3	g^8	W^3	B_1^3	$\frac{1}{2}Y$	Q	Block-1	Block-2	Block-3	ω_L	ω_R	E8-root
	<i>G-1: Quarks</i>									sqrt(2/3)												
	$u_L^{^R}$	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-L}^\wedge	f_{L+}	q_I^R	1	0	Yes
	$u_L^{^G}$	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-L}^\wedge	f_{L+}	q_I^G	1	0	Yes
	$u_L^{^B}$	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-L}^\wedge	f_{L+}	q_I^B	1	0	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	-1	0	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	-1	0	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	-1	0	Yes

$d_L^{\wedge R}$	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	1	0	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	1	0	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	1	0	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	-1	0	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	-1	0	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	-1	0	Yes
E8	$1/2i*\omega_T^3$	$\frac{1}{2}\omega_S^3$	U^3	V^3	w	x	y	z	B_{2*}	$g3$	g^8	W^3	B_1^3	$\frac{1}{2}Y$	Q	Block-1	Block-2	Block-3	ω_L	ω_R	E8-root
$u_R^{\wedge R}$	- 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-R}^{\wedge}	f_{R+}	q_I^R	0	1	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-R}^{\wedge}	f_{R+}	q_I^G	0	1	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-R}^{\wedge}	f_{R+}	q_I^B	0	1	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-R}^{\vee}	f_{R+}	q_I^R	0	-1	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-R}^{\vee}	f_{R+}	q_I^G	0	-1	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-R}^{\vee}	f_{R+}	q_I^B	0	-1	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-R}^{\wedge}	f_{R-}	q_I^R	0	1	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-R}^{\wedge}	f_{R-}	q_I^G	0	1	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-R}^{\wedge}	f_{R-}	q_I^B	0	1	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-R}^{\vee}	f_{R-}	q_I^R	0	-1	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-R}^{\vee}	f_{R-}	q_I^G	0	-1	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-R}^{\vee}	f_{R-}	q_I^B	0	-1	Yes
E8	$1/2i*\omega_T^3$	$\frac{1}{2}\omega_S^3$	U^3	V^3	w	x	y	z	B_{2*}	$g3$	g^8	W^3	B_1^3	$\frac{1}{2}Y$	Q	Block-1	Block-2	Block-3	ω_L	ω_R	E8-root
<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	f_{G-L}^{\wedge}	f_{R-}	q_I^r	1	0	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	0	- 1/2	- 2/3	- 2/3	f_{G-L}^{\wedge}	f_{R-}	q_I^g	1	0	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	0	- 1/2	- 2/3	- 2/3	f_{G-L}^{\wedge}	f_{R-}	q_I^b	1	0	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	0	- 1/2	- 2/3	- 2/3	f_{G-L}^{\vee}	f_{R-}	q_I^r	-1	0	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	0	- 1/2	- 2/3	- 2/3	f_{G-L}^{\vee}	f_{R-}	q_I^g	-1	0	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	0	- 1/2	- 2/3	- 2/3	f_{G-L}^{\vee}	f_{R-}	q_I^b	-1	0	Yes
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	f_{G-L}^{\wedge}	f_{R+}	q_I^r	1	0	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	0	1/2	1/3	1/3	f _{G-L} [^]	f _{R+}	q _I ^g	1	0	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	0	1/2	1/3	1/3	f _{G-L} [^]	f _{R+}	q _I ^b	1	0	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	0	1/2	1/3	1/3	f _{G-L} [^]	f _{R+}	q _I ^r	-1	0	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	0	1/2	1/3	1/3	f _{G-L} [^]	f _{R+}	q _I ^g	-1	0	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	0	1/2	1/3	1/3	f _{G-L} [^]	f _{R+}	q _I ^b	-1	0	Yes
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	Block-1	Block-2	Block-3	ω _L	ω _R	E8-root
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	- 1/2	0	- 1/6	- 2/3	f _{G-R} [^]	f _{L-}	q _I ^r	0	1	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	- 1/2	0	- 1/6	- 2/3	f _{G-R} [^]	f _{L-}	q _I ^g	0	1	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	- 1/2	0	- 1/6	- 2/3	f _{G-R} [^]	f _{L-}	q _I ^b	0	1	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	- 1/2	0	- 1/6	- 2/3	f _{G-R} [^]	f _{L-}	q _I ^r	0	-1	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	- 1/2	0	- 1/6	- 2/3	f _{G-R} [^]	f _{L-}	q _I ^g	0	-1	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	- 1/2	0	- 1/6	- 2/3	f _{G-R} [^]	f _{L-}	q _I ^b	0	-1	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	1/2	0	- 1/6	1/3	f _{G-R} [^]	f _{L+}	q _I ^r	0	1	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	1/2	0	- 1/6	1/3	f _{G-R} [^]	f _{L+}	q _I ^g	0	1	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	1/2	0	- 1/6	1/3	f _{G-R} [^]	f _{L+}	q _I ^b	0	1	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	1/2	0	- 1/6	1/3	f _{G-R} [^]	f _{L+}	q _I ^r	0	-1	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	1/2	0	- 1/6	1/3	f _{G-R} [^]	f _{L+}	q _I ^g	0	-1	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	1/2	0	- 1/6	1/3	f _{G-R} [^]	f _{L+}	q _I ^b	0	-1	Yes
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	Block-1	Block-2	Block-3	ω _L	ω _R	E8-root
G-2: Quarks									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	0	1/2	2/3	2/3	f _{G-L} [^]	f_{R+}	q _I ^R	1	0	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	0	1/2	2/3	2/3	f _{G-L} [^]	f_{R+}	q _I ^G	1	0	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	0	1/2	2/3	2/3	f _{G-L} [^]	f_{R+}	q _I ^B	1	0	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	0	1/2	2/3	2/3	f _{G-L} [^]	f_{R+}	q _I ^R	-1	0	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	0	1/2	2/3	2/3	f _{G-L} [^]	f_{R+}	q _I ^G	-1	0	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	0	1/2	2/3	2/3	f _{G-L} [^]	f_{R+}	q _I ^B	-1	0	Yes
s _L ^{^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	1	0	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	0	- 1/2	- 1/3	- 1/3	f_{G-L}^{\wedge}	f_{R-}	q_I^G	1	0	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	0	- 1/2	- 1/3	- 1/3	f_{G-L}^{\wedge}	f_{R-}	q_I^B	1	0	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	0	- 1/2	- 1/3	- 1/3	f_{G-L}^{\vee}	f_{R-}	q_I^R	-1	0	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	0	- 1/2	- 1/3	- 1/3	f_{G-L}^{\vee}	f_{R-}	q_I^G	-1	0	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	0	- 1/2	- 1/3	- 1/3	f_{G-L}^{\vee}	f_{R-}	q_I^B	-1	0	Yes
E8	1/2i* ω_T^3	$\frac{1}{2}\omega_S^3$	U ³	V ³	w	x	y	z	B _{2*}	g3	g ⁸	W ³	B ₁ ³	$\frac{1}{2}Y$	Q	Block-1	Block-2	Block-3	ω_L	ω_R	E8-root
$c_R^{\wedge R}$	- 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}^{\wedge}	f_{L+}	q_I^R	0	1	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	1/2	0	1/6	2/3	f_{G-R}^{\wedge}	f_{L+}	q_I^G	0	1	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	1/2	0	1/6	2/3	f_{G-R}^{\wedge}	f_{L+}	q_I^B	0	1	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	1/2	0	1/6	2/3	f_{G-R}^{\vee}	f_{L+}	q_I^R	0	-1	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	1/2	0	1/6	2/3	f_{G-R}^{\vee}	f_{L+}	q_I^G	0	-1	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	1/2	0	1/6	2/3	f_{G-R}^{\vee}	f_{L+}	q_I^B	0	-1	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	- 1/2	0	1/6	- 1/3	f_{G-R}^{\wedge}	f_{L-}	q_I^R	0	1	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	- 1/2	0	1/6	- 1/3	f_{G-R}^{\wedge}	f_{L-}	q_I^G	0	1	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	- 1/2	0	1/6	- 1/3	f_{G-R}^{\wedge}	f_{L-}	q_I^B	0	1	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	- 1/2	0	1/6	- 1/3	f_{G-R}^{\vee}	f_{L-}	q_I^R	0	-1	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	- 1/2	0	1/6	- 1/3	f_{G-R}^{\vee}	f_{L-}	q_I^G	0	-1	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	- 1/2	0	1/6	- 1/3	f_{G-R}^{\vee}	f_{L-}	q_I^B	0	-1	Yes
E8	1/2i* ω_T^3	$\frac{1}{2}\omega_S^3$	U ³	V ³	w	x	y	z	B _{2*}	g3	g ⁸	W ³	B ₁ ³	$\frac{1}{2}Y$	Q	Block-1	Block-2	Block-3	ω_L	ω_R	E8-root
G-2: anti-Quarks									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	- 1/2	0	- 1/6	- 2/3	f_{G-L}^{\wedge}	f_{L-}	q_I^r	1	0	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	- 1/2	0	- 1/6	- 2/3	f_{G-L}^{\wedge}	f_{L-}	q_I^g	1	0	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	- 1/2	0	- 1/6	- 2/3	f_{G-L}^{\wedge}	f_{L-}	q_I^b	1	0	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	- 1/2	0	- 1/6	- 2/3	f_{G-L}^{\vee}	f_{L-}	q_I^r	-1	0	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	- 1/2	0	- 1/6	- 2/3	f_{G-L}^{\vee}	f_{L-}	q_I^g	-1	0	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	- 1/2	0	- 1/6	- 2/3	f_{G-L}^{\vee}	f_{L-}	q_I^b	-1	0	Yes
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	1/2	0	- 1/6	1/3	f_{G-L}^{\wedge}	f_{L+}	q_I^r	1	0	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	1/2	0	- 1/6	1/3	f_{G-L}^{\wedge}	f_{L+}	q_I^g	1	0	Yes

Anti-s _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	1	0	Yes
Anti-s _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	-1	0	Yes
Anti-s _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	-1	0	Yes
Anti-s _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	-1	0	Yes
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	Block-1	Block-2	Block-3	ω _L	ω _R	E8-root
Anti-c _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-R} [^]	f_{R-}	q _I ^r	0	1	Yes
Anti-c _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-R} [^]	f_{R-}	q _I ^g	0	1	Yes
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	0	- 1/2	- 2/3	- 2/3	f _{G-R} [^]	f_{R-}	q _I ^b	0	1	Yes
Anti-c _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-R} [^]	f_{R-}	q _I ^r	0	-1	Yes
Anti-c _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-R} [^]	f_{R-}	q _I ^g	0	-1	Yes
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	0	- 1/2	- 2/3	- 2/3	f _{G-R} [^]	f_{R-}	q _I ^b	0	-1	Yes
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	0	1/2	1/3	1/3	f _{G-R} [^]	f_{R+}	q _I ^r	0	1	Yes
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	0	1/2	1/3	1/3	f _{G-R} [^]	f_{R+}	q _I ^g	0	1	Yes
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	0	1/2	1/3	1/3	f _{G-R} [^]	f_{R+}	q _I ^b	0	1	Yes
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	0	1/2	1/3	1/3	f _{G-R} [^]	f_{R+}	q _I ^r	0	-1	Yes
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	0	1/2	1/3	1/3	f _{G-R} [^]	f_{R+}	q _I ^g	0	-1	Yes
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	0	1/2	1/3	1/3	f _{G-R} [^]	f_{R+}	q _I ^b	0	-1	Yes
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	Block-1	Block-2	Block-3	ω _L	ω _R	E8-root
G-3: Quarks (no physical states)									sqrt(2/3)												
t _L ^{^R}				1		-1			1/3	1/2	0.29	1/2	1/2	1/6	2/3	1	φ ₊₊	q _{II} ^{-R}	0	0	Yes
t _L ^{^G}				1			-1		1/3	- 1/2	0.29	1/2	1/2	1/6	2/3	1	φ ₊₊	q _{II} ^{-G}	0	0	Yes
t _L ^{^B}				1				-1	1/3	0	-0.58	1/2	1/2	1/6	2/3	1	φ ₊₊	q _{II} ^{-B}	0	0	Yes
t _L ^{^R}				1		-1			1/3	1/2	0.29	1/2	1/2	1/6	2/3	1	φ ₊₊	q _{II} ^{-R}	0	0	Yes
t _L ^{^G}				1			-1		1/3	- 1/2	0.29	1/2	1/2	1/6	2/3	1	φ ₊₊	q _{II} ^{-G}	0	0	Yes
t _L ^{^B}				1				-1	1/3	0	-0.58	1/2	1/2	1/6	2/3	1	φ ₊₊	q _{II} ^{-B}	0	0	Yes
t _R ^{^R}							1	1	- 2/3	1/2	0.29	0	0	2/3	2/3	1	1	q _{III} ^R	0	0	Yes
t _R ^{^G}						1		1	- 2/3	- 1/2	0.29	0	0	2/3	2/3	1	1	q _{III} ^G	0	0	Yes
t _R ^{^B}						1	1		- 2/3	0	-0.58	0	0	2/3	2/3	1	1	q _{III} ^B	0	0	Yes

$t_R^{\vee R}$							1	1	- 2/3	1/2	0.29	0	0	2/3	2/3	<u>1</u>	<u>1</u>	q_{III}^R	0	0	Yes
$t_R^{\vee G}$							1		- 2/3	- 1/2	0.29	0	0	2/3	2/3	<u>1</u>	<u>1</u>	q_{III}^G	0	0	Yes
$t_R^{\vee B}$							1	1	- 2/3	0	-0.58	0	0	2/3	2/3	<u>1</u>	<u>1</u>	q_{III}^B	0	0	Yes
$b_L^{\wedge R}$			-1				-1		1/3	1/2	0.29	- 1/2	1/2	1/6	- 1/3	<u>1</u>	ϕ_{0+}	q_{II-}^R	0	0	Yes
$b_L^{\wedge G}$			-1					-1	1/3	- 1/2	0.29	- 1/2	1/2	1/6	- 1/3	<u>1</u>	ϕ_{0+}	q_{II-}^G	0	0	Yes
$b_L^{\wedge B}$			-1					-1	1/3	0	-0.58	- 1/2	1/2	1/6	- 1/3	<u>1</u>	ϕ_{0+}	q_{II-}^B	0	0	Yes
$b_L^{\vee R}$			-1				-1		1/3	1/2	0.29	- 1/2	1/2	1/6	- 1/3	<u>1</u>	ϕ_{0+}	q_{II-}^R	0	0	Yes
$b_L^{\vee G}$			-1					-1	1/3	- 1/2	0.29	- 1/2	1/2	1/6	- 1/3	<u>1</u>	ϕ_{0+}	q_{II-}^G	0	0	Yes
$b_L^{\vee B}$			-1					-1	1/3	0	-0.58	- 1/2	1/2	1/6	- 1/3	<u>1</u>	ϕ_{0+}	q_{II-}^B	0	0	Yes
$b_R^{\wedge R}$					1	-1			1/3	1/2	0.29	0	0	- 1/3	- 1/3	<u>1</u>	<u>1</u>	q_{II+}^R	0	0	Yes
$b_R^{\wedge G}$					1		-1		1/3	- 1/2	0.29	0	0	- 1/3	- 1/3	<u>1</u>	<u>1</u>	q_{II+}^G	0	0	Yes
$b_R^{\wedge B}$					1			-1	1/3	0	-0.58	0	0	- 1/3	- 1/3	<u>1</u>	<u>1</u>	q_{II+}^B	0	0	Yes
$b_R^{\vee R}$					1	-1			1/3	1/2	0.29	0	0	- 1/3	- 1/3	<u>1</u>	<u>1</u>	q_{II+}^R	0	0	Yes
$b_R^{\vee G}$					1		-1		1/3	- 1/2	0.29	0	0	- 1/3	- 1/3	<u>1</u>	<u>1</u>	q_{II+}^G	0	0	Yes
$b_R^{\vee B}$					1			-1	1/3	0	-0.58	0	0	- 1/3	- 1/3	<u>1</u>	<u>1</u>	q_{II+}^B	0	0	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	ω_L	ω_R	E8-root
G-3: anti-Quarks (probably no physical states)																					
Anti- $t_L^{\wedge r}$							-1	-1	2/3	- 1/2	-0.29	0	0	- 2/3	- 2/3	<u>1</u>	<u>1</u>	q_{III}^r	0	0	Yes
Anti- $t_L^{\wedge g}$							-1		2/3	1/2	-0.29	0	0	- 2/3	- 2/3	<u>1</u>	<u>1</u>	q_{III}^g	0	0	Yes
Anti- $t_L^{\wedge b}$							-1	-1	2/3	0	0.58	0	0	- 2/3	- 2/3	<u>1</u>	<u>1</u>	q_{III}^b	0	0	Yes
Anti- $t_L^{\vee r}$							-1	-1	2/3	- 1/2	-0.29	0	0	- 2/3	- 2/3	<u>1</u>	<u>1</u>	q_{III}^r	0	0	Yes
Anti- $t_L^{\vee g}$							-1		2/3	1/2	-0.29	0	0	- 2/3	- 2/3	<u>1</u>	<u>1</u>	q_{III}^g	0	0	Yes
Anti- $t_L^{\vee b}$							-1	-1	2/3	0	0.58	0	0	- 2/3	- 2/3	<u>1</u>	<u>1</u>	q_{III}^b	0	0	Yes
Anti- $t_R^{\wedge r}$				-1		1			- 1/3	- 1/2	-0.29	- 1/2	- 1/2	- 1/6	- 2/3	<u>1</u>	ϕ_{+}	q_{II-}^r	0	0	Yes
Anti- $t_R^{\wedge g}$				-1			1		- 1/3	1/2	-0.29	- 1/2	- 1/2	- 1/6	- 2/3	<u>1</u>	ϕ_{+}	q_{II-}^g	0	0	Yes
Anti- $t_R^{\wedge b}$				-1				1	- 1/3	0	0.58	- 1/2	- 1/2	- 1/6	- 2/3	<u>1</u>	ϕ_{+}	q_{II-}^b	0	0	Yes
Anti- $t_R^{\vee r}$				-1		1			- 1/3	- 1/2	-0.29	- 1/2	- 1/2	- 1/6	- 2/3	<u>1</u>	ϕ_{+}	q_{II-}^r	0	0	Yes
Anti- $t_R^{\vee g}$				-1			1		- 1/3	1/2	-0.29	- 1/2	- 1/2	- 1/6	- 2/3	<u>1</u>	ϕ_{+}	q_{II-}^g	0	0	Yes

Anti-t _R ^{∨b}				-1				1	- 1/3	0	0.58	- 1/2	- 1/2	- 1/6	- 2/3	<u>1</u>	ϕ ₊	q ^{-b}	0	0	Yes
Anti-b _L ^{^r}					1	1			- 1/3	- 1/2	-0.29	0	0	1/3	1/3	<u>1</u>	<u>1</u>	q ^{+r}	0	0	Yes
Anti-b _L ^{^g}					1		1		- 1/3	1/2	-0.29	0	0	1/3	1/3	<u>1</u>	<u>1</u>	q ^{+g}	0	0	Yes
Anti-b _L ^{^b}					1			1	- 1/3	0	0.58	0	0	1/3	1/3	<u>1</u>	<u>1</u>	q ^{+b}	0	0	Yes
Anti-b _L ^{∨r}					1	1			- 1/3	- 1/2	-0.29	0	0	1/3	1/3	<u>1</u>	<u>1</u>	q ^{+r}	0	0	Yes
Anti-b _L ^{∨g}					1		1		- 1/3	1/2	-0.29	0	0	1/3	1/3	<u>1</u>	<u>1</u>	q ^{+g}	0	0	Yes
Anti-b _L ^{∨b}					1			1	- 1/3	0	0.58	0	0	1/3	1/3	<u>1</u>	<u>1</u>	q ^{+b}	0	0	Yes
Anti-b _R ^{^r}			1			1			- 1/3	- 1/2	-0.29	1/2	- 1/2	- 1/6	1/3	<u>1</u>	ϕ ₁₊	q ^{-r}	0	0	Yes
Anti-b _R ^{^g}			1				1		- 1/3	1/2	-0.29	1/2	- 1/2	- 1/6	1/3	<u>1</u>	ϕ ₁₊	q ^{-g}	0	0	Yes
Anti-b _R ^{^b}			1					1	- 1/3	0	0.58	1/2	- 1/2	- 1/6	1/3	<u>1</u>	ϕ ₁₊	q ^{-b}	0	0	Yes
Anti-b _R ^{∨r}			1			1			- 1/3	- 1/2	-0.29	1/2	- 1/2	- 1/6	1/3	<u>1</u>	ϕ ₁₊	q ^{-r}	0	0	Yes
Anti-b _R ^{∨g}			1				1		- 1/3	1/2	-0.29	1/2	- 1/2	- 1/6	1/3	<u>1</u>	ϕ ₁₊	q ^{-g}	0	0	Yes
Anti-b _R ^{∨b}			1					1	- 1/3	0	0.58	1/2	- 1/2	- 1/6	1/3	<u>1</u>	ϕ ₁₊	q ^{-b}	0	0	Yes
E8	1/2i*ω _T ³	½ ω _S ³	U ³	V ³	w	x (R)	y (G)	z (B)	B _{2*}	g3	g ⁸	W ³	B ₁ ³	½Y	Q	Block-1	Block-2	Block-3	ω _L	ω _R	E8-root