SAMB for "Th"

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- Group: No. 29 T_h $m-3$ [cubic]

- Generation condition
  - model type: `tight_binding`
  - time-reversal type: `electric`
  - irrep: `[Ag]`
  - `spinful`

- Kets: dimension = 64

Table 1: Hilbert space for full matrix.

No.	ket	No.	ket	No.	ket	No.	ket	No.	ket
1	$(s,\uparrow)@\mathrm{A}_1$	2	$(s,\downarrow)@\mathrm{A}_1$	3	$(p_x,\uparrow)@\mathrm{A}_1$	4	$(p_x,\downarrow)@\mathrm{A}_1$	5	$(p_y,\uparrow)@\mathrm{A}_1$
6	$(p_y,\downarrow)@\mathrm{A}_1$	7	$(p_z,\uparrow)@\mathrm{A}_1$	8	$(p_z,\downarrow)@\mathrm{A}_1$	9	$(s,\uparrow)@\mathrm{A}_2$	10	$(s,\downarrow)@\mathrm{A}_2$
11	$(p_x,\uparrow)@\mathrm{A}_2$	12	$(p_x,\downarrow)@\mathrm{A}_2$	13	$(p_y,\uparrow)@\mathrm{A}_2$	14	$(p_y,\downarrow)@\mathrm{A}_2$	15	$(p_z,\uparrow)@\mathrm{A}_2$
16	$(p_z,\downarrow)@\mathrm{A}_2$	17	$(s,\uparrow)@\mathrm{A}_3$	18	$(s,\downarrow)@\mathrm{A}_3$	19	$(p_x,\uparrow)@\mathrm{A}_3$	20	$(p_x,\downarrow)@\mathrm{A}_3$
21	$(p_y,\uparrow)@\mathrm{A}_3$	22	$(p_y,\downarrow)@\mathrm{A}_3$	23	$(p_z,\uparrow)@\mathrm{A}_3$	24	$(p_z,\downarrow)@\mathrm{A}_3$	25	$(s,\uparrow)@\mathrm{A}_4$
26	$(s,\downarrow)@\mathrm{A}_4$	27	$(p_x,\uparrow)@\mathrm{A}_4$	28	$(p_x,\downarrow)@\mathrm{A}_4$	29	$(p_y,\uparrow)@\mathrm{A}_4$	30	$(p_y,\downarrow)@\mathrm{A}_4$
31	$(p_z,\uparrow)@\mathrm{A}_4$	32	$(p_z,\downarrow)@\mathrm{A}_4$	33	$(s,\uparrow)@\mathrm{A}_5$	34	$(s,\downarrow)@\mathrm{A}_5$	35	$(p_x,\uparrow)@\mathrm{A}_5$
36	$(p_x,\downarrow)@\mathrm{A}_5$	37	$(p_y,\uparrow)@\mathrm{A}_5$	38	$(p_y,\downarrow)@\mathrm{A}_5$	39	$(p_z,\uparrow)@\mathrm{A}_5$	40	$(p_z,\downarrow)@\mathrm{A}_5$
41	$(s,\uparrow)@\mathrm{A}_6$	42	$(s,\downarrow)@\mathrm{A}_6$	43	$(p_x,\uparrow)@\mathrm{A}_6$	44	$(p_x,\downarrow)@\mathrm{A}_6$	45	$(p_y,\uparrow)@\mathrm{A}_6$
46	$(p_y,\downarrow)@\mathrm{A}_6$	47	$(p_z,\uparrow)@\mathrm{A}_6$	48	$(p_z,\downarrow)@\mathrm{A}_6$	49	$(s,\uparrow)@\mathrm{A}_7$	50	$(s,\downarrow)@\mathrm{A}_7$
51	$(p_x,\uparrow)@\mathrm{A}_7$	52	$(p_x,\downarrow)@\mathrm{A}_7$	53	$(p_y,\uparrow)@\mathrm{A}_7$	54	$(p_y,\downarrow)@\mathrm{A}_7$	55	$(p_z,\uparrow)@\mathrm{A}_7$
56	$(p_z,\downarrow)@\mathrm{A}_7$	57	$(s,\uparrow)@\mathrm{A}_8$	58	$(s,\downarrow)@\mathrm{A}_8$	59	$(p_x,\uparrow)@\mathrm{A}_8$	60	$(p_x,\downarrow)@\mathrm{A}_8$
61	$(p_y,\uparrow)@\mathrm{A}_8$	62	$(p_y,\downarrow)@\mathrm{A}_8$	63	$(p_z,\uparrow)@\mathrm{A}_8$	64	$(p_z,\downarrow)@\mathrm{A}_8$		

- Sites in (primitive) unit cell:

Table 2: Site-clusters.

	site	position	mapping
S_1	A_1	$\begin{pmatrix} 1 & 1 & 1 \end{pmatrix}$	[1,5,9]
	A_2	$\begin{pmatrix} -1 & -1 & 1 \end{pmatrix}$	[2,6,11]
	A_3	$\begin{pmatrix} 1 & -1 & -1 \end{pmatrix}$	[3,7,12]
	A_4	$\begin{pmatrix} -1 & 1 & -1 \end{pmatrix}$	[4,8,10]
	A_5	$\begin{pmatrix} -1 & -1 & -1 \end{pmatrix}$	[13,17,21]
	A_6	$\begin{pmatrix} 1 & 1 & -1 \end{pmatrix}$	[14,18,23]
	A_7	$\begin{pmatrix} -1 & 1 & 1 \end{pmatrix}$	[15,19,24]
	A_8	$\begin{pmatrix} 1 & -1 & 1 \end{pmatrix}$	[16,20,22]

- Bonds in (primitive) unit cell:

Table 3: Bond-clusters.

	bond	tail	head	n	#	$\boldsymbol{b}@\boldsymbol{c}$	mapping
B_1	b_1	A_6	A_1	1	1	$\begin{pmatrix} 0 & 0 & -2 \end{pmatrix} @ \begin{pmatrix} 1 & 1 & 0 \end{pmatrix}$	[1,-14]
	b_2	A_5	A_2	1	1	$\begin{pmatrix} 0 & 0 & -2 \end{pmatrix} @ \begin{pmatrix} -1 & -1 & 0 \end{pmatrix}$	[2,-13]
	b_3	A_8	A_3	1	1	$\begin{pmatrix} 0 & 0 & 2 \end{pmatrix} @ \begin{pmatrix} 1 & -1 & 0 \end{pmatrix}$	[3,-16]
	b_4	A_7	A_4	1	1	$\begin{pmatrix} 0 & 0 & 2 \end{pmatrix} @ \begin{pmatrix} -1 & 1 & 0 \end{pmatrix}$	[4,-15]
	b_5	A_7	A_1	1	1	$\begin{pmatrix} -2 & 0 & 0 \end{pmatrix} @ \begin{pmatrix} 0 & 1 & 1 \end{pmatrix}$	[5,-19]
	b_6	A_8	A_2	1	1	$\begin{pmatrix} 2 & 0 & 0 \end{pmatrix} @ \begin{pmatrix} 0 & -1 & 1 \end{pmatrix}$	[6,-20]
	b_7	A_5	A_3	1	1	$\begin{pmatrix} -2 & 0 & 0 \end{pmatrix} @ \begin{pmatrix} 0 & -1 & -1 \end{pmatrix}$	[7,-17]
	b_8	A_6	A_4	1	1	$\begin{pmatrix} 2 & 0 & 0 \end{pmatrix} @ \begin{pmatrix} 0 & 1 & -1 \end{pmatrix}$	[8,-18]
	b_9	A_8	A_1	1	1	$\begin{pmatrix} 0 & -2 & 0 \end{pmatrix} @ \begin{pmatrix} 1 & 0 & 1 \end{pmatrix}$	[9,-22]
	b_{10}	A_5	A_4	1	1	$\begin{pmatrix} 0 & -2 & 0 \end{pmatrix} @ \begin{pmatrix} -1 & 0 & -1 \end{pmatrix}$	[10,-21]
	b_{11}	A_7	A_2	1	1	$\begin{pmatrix} 0 & 2 & 0 \end{pmatrix} @ \begin{pmatrix} -1 & 0 & 1 \end{pmatrix}$	[11,-24]

continued ...

Table 3

bond	tail	head	n	#	$\boldsymbol{b}$@$\boldsymbol{c}$	mapping
b_{12}	A_6	A_3	1	1	$\begin{pmatrix}0 & 2 & 0\end{pmatrix}$ @ $\begin{pmatrix}1 & 0 & -1\end{pmatrix}$	[12,-23]

- SAMB:

  No. 1 $\hat{\mathbb{Q}}_0^{(A_g)}$ $[\mathrm{M}_1, \mathrm{S}_1]$

  $\hat{\mathbb{Z}}_1 = \mathbb{X}_1[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}]$

  No. 2 $\hat{\mathbb{Q}}_0^{(A_g)}$ $[\mathrm{M}_2, \mathrm{S}_1]$

  $$\hat{\mathbb{Z}}_2 = \frac{\sqrt{3}\mathbb{X}_5[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_2[\mathbb{Q}_{1,0}^{(s,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_6[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_3[\mathbb{Q}_{1,1}^{(s,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_7[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_4[\mathbb{Q}_{1,2}^{(s,T_u)}]}{3}$$

  No. 3 $\hat{\mathbb{Q}}_0^{(A_g)}(1,0)$ $[\mathrm{M}_2, \mathrm{S}_1]$

  $$\hat{\mathbb{Z}}_3 = \frac{\sqrt{3}\mathbb{X}_{10}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_4[\mathbb{Q}_{1,2}^{(s,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_8[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_2[\mathbb{Q}_{1,0}^{(s,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_9[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_3[\mathbb{Q}_{1,1}^{(s,T_u)}]}{3}$$

  No. 4 $\hat{\mathbb{G}}_3^{(A_g)}(1,-1)$ $[\mathrm{M}_2, \mathrm{S}_1]$

  $$\hat{\mathbb{Z}}_4 = \frac{\sqrt{3}\mathbb{X}_{11}[\mathbb{G}_{2,0}^{(a,T_u)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{1,0}^{(s,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{12}[\mathbb{G}_{2,1}^{(a,T_u)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{1,1}^{(s,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{13}[\mathbb{G}_{2,2}^{(a,T_u)}(1,-1)] \otimes \mathbb{U}_4[\mathbb{Q}_{1,2}^{(s,T_u)}]}{3}$$

  No. 5 $\hat{\mathbb{G}}_3^{(A_g)}(1,1)$ $[\mathrm{M}_2, \mathrm{S}_1]$

  $\hat{\mathbb{Z}}_5 = \mathbb{X}_{14}[\mathbb{G}_0^{(a,A_u)}(1,1)] \otimes \mathbb{U}_8[\mathbb{Q}_3^{(s,A_u)}]$

  No. 6 $\hat{\mathbb{Q}}_0^{(A_g)}$ $[\mathrm{M}_3, \mathrm{S}_1]$

  $\hat{\mathbb{Z}}_6 = \mathbb{X}_{15}[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}]$

No. 7 $\hat{\mathbb{Q}}_0^{(A_g)}(1,1)$ $[\mathrm{M}_3, \mathrm{S}_1]$

$$\hat{\mathbb{Z}}_7 = \mathbb{X}_{16}[\mathbb{Q}_0^{(a,A_g)}(1,1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}]$$

No. 8 $\hat{\mathbb{Q}}_0^{(A_g)}$ $[\mathrm{M}_3, \mathrm{S}_1]$

$$\hat{\mathbb{Z}}_8 = \frac{\sqrt{3}\mathbb{X}_{19}[\mathbb{Q}_{2,0}^{(a,T_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(s,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{20}[\mathbb{Q}_{2,1}^{(a,T_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(s,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{21}[\mathbb{Q}_{2,2}^{(a,T_g)}] \otimes \mathbb{U}_7[\mathbb{Q}_{2,2}^{(s,T_g)}]}{3}$$

No. 9 $\hat{\mathbb{Q}}_0^{(A_g)}(1,-1)$ $[\mathrm{M}_3, \mathrm{S}_1]$

$$\hat{\mathbb{Z}}_9 = \frac{\sqrt{3}\mathbb{X}_{24}[\mathbb{Q}_{2,0}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(s,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{25}[\mathbb{Q}_{2,1}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(s,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{26}[\mathbb{Q}_{2,2}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_7[\mathbb{Q}_{2,2}^{(s,T_g)}]}{3}$$

No. 10 $\hat{\mathbb{G}}_3^{(A_g)}(1,0)$ $[\mathrm{M}_3, \mathrm{S}_1]$

$$\hat{\mathbb{Z}}_{10} = \frac{\sqrt{3}\mathbb{X}_{27}[\mathbb{G}_{1,0}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(s,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{28}[\mathbb{G}_{1,1}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(s,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{29}[\mathbb{G}_{1,2}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_7[\mathbb{Q}_{2,2}^{(s,T_g)}]}{3}$$

No. 11 $\hat{\mathbb{Q}}_0^{(A_g)}$ $[\mathrm{M}_1, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{11} = \mathbb{X}_1[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_9[\mathbb{Q}_0^{(u,A_g)}]$$

No. 12 $\hat{\mathbb{G}}_3^{(A_g)}(1,-1)$ $[\mathrm{M}_1, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{12} = \frac{\sqrt{3}\mathbb{X}_2[\mathbb{M}_{1,0}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_{21}[\mathbb{T}_{2,0}^{(u,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_3[\mathbb{M}_{1,1}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_{22}[\mathbb{T}_{2,1}^{(u,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_4[\mathbb{M}_{1,2}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_{23}[\mathbb{T}_{2,2}^{(u,T_g)}]}{3}$$

No. 13 $\hat{\mathbb{Q}}_4^{(A_g)}(1,-1)$ $[\mathrm{M}_1, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{13} = -\frac{\sqrt{3}\mathbb{X}_2[\mathbb{M}_{1,0}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_{24}[\mathbb{T}_{4,0}^{(u,T_g,1)}]}{3} - \frac{\sqrt{3}\mathbb{X}_3[\mathbb{M}_{1,1}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_{25}[\mathbb{T}_{4,1}^{(u,T_g,1)}]}{3} - \frac{\sqrt{3}\mathbb{X}_4[\mathbb{M}_{1,2}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_{26}[\mathbb{T}_{4,2}^{(u,T_g,1)}]}{3}$$

No. 14 $\hat{\mathbb{Q}}_0^{(A_g)}$ $[\mathrm{M}_2, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{14} = \frac{\sqrt{3}\mathbb{X}_5[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_{10}[\mathbb{Q}_{1,0}^{(u,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_6[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_{11}[\mathbb{Q}_{1,1}^{(u,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_7[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_{12}[\mathbb{Q}_{1,2}^{(u,T_u)}]}{3}$$

No. 15 $\hat{\mathbb{Q}}_4^{(A_g)}$ $[\mathrm{M}_2, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{15} = \frac{\sqrt{3}\mathbb{X}_5[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_{18}[\mathbb{Q}_{3,0}^{(u,T_u,1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_6[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_{19}[\mathbb{Q}_{3,1}^{(u,T_u,1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_7[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_{20}[\mathbb{Q}_{3,2}^{(u,T_u,1)}]}{3}$$

No. 16 $\hat{\mathbb{Q}}_0^{(A_g)}(1,0)$ $[\mathrm{M}_2, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{16} = \frac{\sqrt{3}\mathbb{X}_{10}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_{12}[\mathbb{Q}_{1,2}^{(u,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_8[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_{10}[\mathbb{Q}_{1,0}^{(u,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_9[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_{11}[\mathbb{Q}_{1,1}^{(u,T_u)}]}{3}$$

No. 17 $\hat{\mathbb{Q}}_4^{(A_g)}(1,0)$ $[\mathrm{M}_2, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{17} = \frac{\sqrt{3}\mathbb{X}_{10}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_{20}[\mathbb{Q}_{3,2}^{(u,T_u,1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_8[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_{18}[\mathbb{Q}_{3,0}^{(u,T_u,1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_9[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_{19}[\mathbb{Q}_{3,1}^{(u,T_u,1)}]}{3}$$

No. 18 $\hat{\mathbb{G}}_3^{(A_g)}(1,-1)$ $[\mathrm{M}_2, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{18} = \frac{\sqrt{3}\mathbb{X}_{11}[\mathbb{G}_{2,0}^{(a,T_u)}(1,-1)] \otimes \mathbb{U}_{10}[\mathbb{Q}_{1,0}^{(u,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{12}[\mathbb{G}_{2,1}^{(a,T_u)}(1,-1)] \otimes \mathbb{U}_{11}[\mathbb{Q}_{1,1}^{(u,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{13}[\mathbb{G}_{2,2}^{(a,T_u)}(1,-1)] \otimes \mathbb{U}_{12}[\mathbb{Q}_{1,2}^{(u,T_u)}]}{3}$$

No. 19 $\hat{\mathbb{G}}_3^{(A_g)}(1,-1)$ $[\mathrm{M}_2, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{19} = -\frac{\sqrt{3}\mathbb{X}_{11}[\mathbb{G}_{2,0}^{(a,T_u)}(1,-1)] \otimes \mathbb{U}_{18}[\mathbb{Q}_{3,0}^{(u,T_u,1)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{12}[\mathbb{G}_{2,1}^{(a,T_u)}(1,-1)] \otimes \mathbb{U}_{19}[\mathbb{Q}_{3,1}^{(u,T_u,1)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{13}[\mathbb{G}_{2,2}^{(a,T_u)}(1,-1)] \otimes \mathbb{U}_{20}[\mathbb{Q}_{3,2}^{(u,T_u,1)}]}{3}$$

No. 20 $\hat{\mathbb{Q}}_0^{(A_g)}$ $[\mathrm{M}_4, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{20} = \frac{\sqrt{3}\mathbb{X}_{48}[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_{10}[\mathbb{Q}_{1,0}^{(u,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{49}[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_{11}[\mathbb{Q}_{1,1}^{(u,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{50}[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_{12}[\mathbb{Q}_{1,2}^{(u,T_u)}]}{3}$$

No. 21 $\hat{\mathbb{Q}}_4^{(A_g)}$ $[\mathrm{M}_4, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{21} = \frac{\sqrt{3}\mathbb{X}_{48}[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_{18}[\mathbb{Q}_{3,0}^{(u,T_u,1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{49}[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_{19}[\mathbb{Q}_{3,1}^{(u,T_u,1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{50}[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_{20}[\mathbb{Q}_{3,2}^{(u,T_u,1)}]}{3}$$

No. 22 $\hat{\mathbb{Q}}_0^{(A_g)}(1,0)$ $[\mathrm{M}_4, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{22} = \frac{\sqrt{3}\mathbb{X}_{51}[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_{10}[\mathbb{Q}_{1,0}^{(u,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{52}[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_{11}[\mathbb{Q}_{1,1}^{(u,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{53}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_{12}[\mathbb{Q}_{1,2}^{(u,T_u)}]}{3}$$

No. 23 $\hat{\mathbb{Q}}_4^{(A_g)}(1,0)$ $[\mathrm{M}_4, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{23} = \frac{\sqrt{3}\mathbb{X}_{51}[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_{18}[\mathbb{Q}_{3,0}^{(u,T_u,1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{52}[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_{19}[\mathbb{Q}_{3,1}^{(u,T_u,1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{53}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_{20}[\mathbb{Q}_{3,2}^{(u,T_u,1)}]}{3}$$

No. 24 $\hat{\mathbb{G}}_3^{(A_g)}(1,-1)$ $[\mathrm{M}_4, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{24} = \frac{\sqrt{3}\mathbb{X}_{54}[\mathbb{G}_{2,0}^{(a,T_u)}(1,-1)] \otimes \mathbb{U}_{10}[\mathbb{Q}_{1,0}^{(u,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{55}[\mathbb{G}_{2,1}^{(a,T_u)}(1,-1)] \otimes \mathbb{U}_{11}[\mathbb{Q}_{1,1}^{(u,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{56}[\mathbb{G}_{2,2}^{(a,T_u)}(1,-1)] \otimes \mathbb{U}_{12}[\mathbb{Q}_{1,2}^{(u,T_u)}]}{3}$$

No. 25 $\hat{\mathbb{G}}_3^{(A_g)}(1,-1)$ $[\mathrm{M}_4, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{25} = -\frac{\sqrt{3}\mathbb{X}_{54}[\mathbb{G}_{2,0}^{(a,T_u)}(1,-1)] \otimes \mathbb{U}_{18}[\mathbb{Q}_{3,0}^{(u,T_u,1)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{55}[\mathbb{G}_{2,1}^{(a,T_u)}(1,-1)] \otimes \mathbb{U}_{19}[\mathbb{Q}_{3,1}^{(u,T_u,1)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{56}[\mathbb{G}_{2,2}^{(a,T_u)}(1,-1)] \otimes \mathbb{U}_{20}[\mathbb{Q}_{3,2}^{(u,T_u,1)}]}{3}$$

No. 26 $\hat{\mathbb{Q}}_0^{(A_g)}$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{26} = \mathbb{X}_{15}[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_9[\mathbb{Q}_0^{(u,A_g)}]$$

No. 27 $\hat{\mathbb{Q}}_0^{(A_g)}(1,1)$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{27} = \mathbb{X}_{16}[\mathbb{Q}_0^{(a,A_g)}(1,1)] \otimes \mathbb{U}_9[\mathbb{Q}_0^{(u,A_g)}]$$

No. 28 $\hat{\mathbb{Q}}_0^{(A_g)}$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{28} = \frac{\sqrt{5}\mathbb{X}_{17}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_{13}[\mathbb{Q}_{2,0}^{(u,E_g)}]}{5} + \frac{\sqrt{5}\mathbb{X}_{18}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_{14}[\mathbb{Q}_{2,1}^{(u,E_g)}]}{5} + \frac{\sqrt{5}\mathbb{X}_{19}[\mathbb{Q}_{2,0}^{(a,T_g)}] \otimes \mathbb{U}_{15}[\mathbb{Q}_{2,0}^{(u,T_g)}]}{5}$$
$$+ \frac{\sqrt{5}\mathbb{X}_{20}[\mathbb{Q}_{2,1}^{(a,T_g)}] \otimes \mathbb{U}_{16}[\mathbb{Q}_{2,1}^{(u,T_g)}]}{5} + \frac{\sqrt{5}\mathbb{X}_{21}[\mathbb{Q}_{2,2}^{(a,T_g)}] \otimes \mathbb{U}_{17}[\mathbb{Q}_{2,2}^{(u,T_g)}]}{5}$$

No. 29 $\hat{\mathbb{G}}_3^{(A_g)}$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{29} = \frac{\sqrt{2}\mathbb{X}_{17}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_{14}[\mathbb{Q}_{2,1}^{(u,E_g)}]}{2} - \frac{\sqrt{2}\mathbb{X}_{18}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_{13}[\mathbb{Q}_{2,0}^{(u,E_g)}]}{2}$$

No. 30 $\hat{\mathbb{Q}}_4^{(A_g)}$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{30} = \frac{\sqrt{30}\mathbb{X}_{17}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_{13}[\mathbb{Q}_{2,0}^{(u,E_g)}]}{10} + \frac{\sqrt{30}\mathbb{X}_{18}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_{14}[\mathbb{Q}_{2,1}^{(u,E_g)}]}{10} - \frac{\sqrt{30}\mathbb{X}_{19}[\mathbb{Q}_{2,0}^{(a,T_g)}] \otimes \mathbb{U}_{15}[\mathbb{Q}_{2,0}^{(u,T_g)}]}{15}$$
$$- \frac{\sqrt{30}\mathbb{X}_{20}[\mathbb{Q}_{2,1}^{(a,T_g)}] \otimes \mathbb{U}_{16}[\mathbb{Q}_{2,1}^{(u,T_g)}]}{15} - \frac{\sqrt{30}\mathbb{X}_{21}[\mathbb{Q}_{2,2}^{(a,T_g)}] \otimes \mathbb{U}_{17}[\mathbb{Q}_{2,2}^{(u,T_g)}]}{15}$$

No. 31 $\hat{\mathbb{Q}}_0^{(A_g)}(1,-1)$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{31} = \frac{\sqrt{5}\mathbb{X}_{22}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_{13}[\mathbb{Q}_{2,0}^{(u,E_g)}]}{5} + \frac{\sqrt{5}\mathbb{X}_{23}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_{14}[\mathbb{Q}_{2,1}^{(u,E_g)}]}{5} + \frac{\sqrt{5}\mathbb{X}_{24}[\mathbb{Q}_{2,0}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_{15}[\mathbb{Q}_{2,0}^{(u,T_g)}]}{5}$$
$$+ \frac{\sqrt{5}\mathbb{X}_{25}[\mathbb{Q}_{2,1}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_{16}[\mathbb{Q}_{2,1}^{(u,T_g)}]}{5} + \frac{\sqrt{5}\mathbb{X}_{26}[\mathbb{Q}_{2,2}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_{17}[\mathbb{Q}_{2,2}^{(u,T_g)}]}{5}$$

No. 32 $\hat{\mathbb{G}}_3^{(A_g)}(1,-1)$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{32} = \frac{\sqrt{2}\mathbb{X}_{22}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_{14}[\mathbb{Q}_{2,1}^{(u,E_g)}]}{2} - \frac{\sqrt{2}\mathbb{X}_{23}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_{13}[\mathbb{Q}_{2,0}^{(u,E_g)}]}{2}$$

No. 33 $\hat{\mathbb{Q}}_4^{(A_g)}(1,-1)$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{33} = \frac{\sqrt{30}\mathbb{X}_{22}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_{13}[\mathbb{Q}_{2,0}^{(u,E_g)}]}{10} + \frac{\sqrt{30}\mathbb{X}_{23}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_{14}[\mathbb{Q}_{2,1}^{(u,E_g)}]}{10} - \frac{\sqrt{30}\mathbb{X}_{24}[\mathbb{Q}_{2,0}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_{15}[\mathbb{Q}_{2,0}^{(u,T_g)}]}{15}$$
$$- \frac{\sqrt{30}\mathbb{X}_{25}[\mathbb{Q}_{2,1}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_{16}[\mathbb{Q}_{2,1}^{(u,T_g)}]}{15} - \frac{\sqrt{30}\mathbb{X}_{26}[\mathbb{Q}_{2,2}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_{17}[\mathbb{Q}_{2,2}^{(u,T_g)}]}{15}$$

No. 34 $\hat{\mathbb{G}}_3^{(A_g)}(1,0)$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{34} = \frac{\sqrt{3}\mathbb{X}_{27}[\mathbb{G}_{1,0}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_{15}[\mathbb{Q}_{2,0}^{(u,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{28}[\mathbb{G}_{1,1}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_{16}[\mathbb{Q}_{2,1}^{(u,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{29}[\mathbb{G}_{1,2}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_{17}[\mathbb{Q}_{2,2}^{(u,T_g)}]}{3}$$

No. 35 $\hat{\mathbb{G}}_3^{(A_g)}$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{35} = \frac{\sqrt{3}\mathbb{X}_{30}[\mathbb{M}_{1,0}^{(a,T_g)}] \otimes \mathbb{U}_{21}[\mathbb{T}_{2,0}^{(u,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{31}[\mathbb{M}_{1,1}^{(a,T_g)}] \otimes \mathbb{U}_{22}[\mathbb{T}_{2,1}^{(u,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{32}[\mathbb{M}_{1,2}^{(a,T_g)}] \otimes \mathbb{U}_{23}[\mathbb{T}_{2,2}^{(u,T_g)}]}{3}$$

No. 36 $\hat{\mathbb{Q}}_4^{(A_g)}$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{36} = -\frac{\sqrt{3}\mathbb{X}_{30}[\mathbb{M}_{1,0}^{(a,T_g)}] \otimes \mathbb{U}_{24}[\mathbb{T}_{4,0}^{(u,T_g,1)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{31}[\mathbb{M}_{1,1}^{(a,T_g)}] \otimes \mathbb{U}_{25}[\mathbb{T}_{4,1}^{(u,T_g,1)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{32}[\mathbb{M}_{1,2}^{(a,T_g)}] \otimes \mathbb{U}_{26}[\mathbb{T}_{4,2}^{(u,T_g,1)}]}{3}$$

No. 37 $\hat{\mathbb{G}}_3^{(A_g)}(1,1)$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{37} = \frac{\sqrt{3}\mathbb{X}_{33}[\mathbb{M}_{1,0}^{(a,T_g)}(1,1)] \otimes \mathbb{U}_{21}[\mathbb{T}_{2,0}^{(u,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{34}[\mathbb{M}_{1,1}^{(a,T_g)}(1,1)] \otimes \mathbb{U}_{22}[\mathbb{T}_{2,1}^{(u,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{35}[\mathbb{M}_{1,2}^{(a,T_g)}(1,1)] \otimes \mathbb{U}_{23}[\mathbb{T}_{2,2}^{(u,T_g)}]}{3}$$

No. 38 $\hat{\mathbb{Q}}_4^{(A_g)}(1,1)$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{38} = -\frac{\sqrt{3}\mathbb{X}_{33}[\mathbb{M}_{1,0}^{(a,T_g)}(1,1)] \otimes \mathbb{U}_{24}[\mathbb{T}_{4,0}^{(u,T_g,1)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{34}[\mathbb{M}_{1,1}^{(a,T_g)}(1,1)] \otimes \mathbb{U}_{25}[\mathbb{T}_{4,1}^{(u,T_g,1)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{35}[\mathbb{M}_{1,2}^{(a,T_g)}(1,1)] \otimes \mathbb{U}_{26}[\mathbb{T}_{4,2}^{(u,T_g,1)}]}{3}$$

No. 39 $\hat{\mathbb{G}}_3^{(A_g)}(1,-1)$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{39} = \frac{\sqrt{3}\mathbb{X}_{36}[\mathbb{M}_{1,0}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_{21}[\mathbb{T}_{2,0}^{(u,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{37}[\mathbb{M}_{1,1}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_{22}[\mathbb{T}_{2,1}^{(u,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{38}[\mathbb{M}_{1,2}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_{23}[\mathbb{T}_{2,2}^{(u,T_g)}]}{3}$$

No. 40 $\hat{\mathbb{Q}}_4^{(A_g)}(1,-1)$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{40} = -\frac{\sqrt{3}\mathbb{X}_{36}[\mathbb{M}_{1,0}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_{24}[\mathbb{T}_{4,0}^{(u,T_g,1)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{37}[\mathbb{M}_{1,1}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_{25}[\mathbb{T}_{4,1}^{(u,T_g,1)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{38}[\mathbb{M}_{1,2}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_{26}[\mathbb{T}_{4,2}^{(u,T_g,1)}]}{3}$$

No. 41 $\hat{\mathbb{G}}_3^{(A_g)}(1,-1)$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{41} = -\frac{\sqrt{3}\mathbb{X}_{39}[\mathbb{M}_{3,0}^{(a,T_g,1)}(1,-1)] \otimes \mathbb{U}_{21}[\mathbb{T}_{2,0}^{(u,T_g)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{40}[\mathbb{M}_{3,1}^{(a,T_g,1)}(1,-1)] \otimes \mathbb{U}_{22}[\mathbb{T}_{2,1}^{(u,T_g)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{41}[\mathbb{M}_{3,2}^{(a,T_g,1)}(1,-1)] \otimes \mathbb{U}_{23}[\mathbb{T}_{2,2}^{(u,T_g)}]}{3}$$

No. 42 $\hat{\mathbb{Q}}_4^{(A_g)}(1,-1)$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{42} = -\frac{\sqrt{3}\mathbb{X}_{42}[\mathbb{M}_{3,0}^{(a,T_g,2)}(1,-1)] \otimes \mathbb{U}_{21}[\mathbb{T}_{2,0}^{(u,T_g)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{43}[\mathbb{M}_{3,1}^{(a,T_g,2)}(1,-1)] \otimes \mathbb{U}_{22}[\mathbb{T}_{2,1}^{(u,T_g)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{44}[\mathbb{M}_{3,2}^{(a,T_g,2)}(1,-1)] \otimes \mathbb{U}_{23}[\mathbb{T}_{2,2}^{(u,T_g)}]}{3}$$

No. 43 $\hat{\mathbb{G}}_3^{(A_g)}(1,-1)$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{43} = \frac{\sqrt{3}\mathbb{X}_{42}[\mathbb{M}_{3,0}^{(a,T_g,2)}(1,-1)] \otimes \mathbb{U}_{24}[\mathbb{T}_{4,0}^{(u,T_g,1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{43}[\mathbb{M}_{3,1}^{(a,T_g,2)}(1,-1)] \otimes \mathbb{U}_{25}[\mathbb{T}_{4,1}^{(u,T_g,1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{44}[\mathbb{M}_{3,2}^{(a,T_g,2)}(1,-1)] \otimes \mathbb{U}_{26}[\mathbb{T}_{4,2}^{(u,T_g,1)}]}{3}$$

No. 44 $\hat{\mathbb{Q}}_4^{(A_g)}(1,-1)$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{44} = \frac{\sqrt{3}\mathbb{X}_{39}[\mathbb{M}_{3,0}^{(a,T_g,1)}(1,-1)] \otimes \mathbb{U}_{24}[\mathbb{T}_{4,0}^{(u,T_g,1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{40}[\mathbb{M}_{3,1}^{(a,T_g,1)}(1,-1)] \otimes \mathbb{U}_{25}[\mathbb{T}_{4,1}^{(u,T_g,1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{41}[\mathbb{M}_{3,2}^{(a,T_g,1)}(1,-1)] \otimes \mathbb{U}_{26}[\mathbb{T}_{4,2}^{(u,T_g,1)}]}{3}$$

No. 45 $\hat{\mathbb{Q}}_0^{(A_g)}(1,0)$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{45} = \frac{\sqrt{3}\mathbb{X}_{45}[\mathbb{T}_{2,0}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_{21}[\mathbb{T}_{2,0}^{(u,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{46}[\mathbb{T}_{2,1}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_{22}[\mathbb{T}_{2,1}^{(u,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{47}[\mathbb{T}_{2,2}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_{23}[\mathbb{T}_{2,2}^{(u,T_g)}]}{3}$$

No. 46 $\hat{\mathbb{G}}_3^{(A_g)}(1,0)$ $[\mathrm{M}_3, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{46} = -\frac{\sqrt{3}\mathbb{X}_{45}[\mathbb{T}_{2,0}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_{24}[\mathbb{T}_{4,0}^{(u,T_g,1)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{46}[\mathbb{T}_{2,1}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_{25}[\mathbb{T}_{4,1}^{(u,T_g,1)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{47}[\mathbb{T}_{2,2}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_{26}[\mathbb{T}_{4,2}^{(u,T_g,1)}]}{3}$$

Table 4: Atomic SAMB group.

group	bra	ket
M_1	$(s,\uparrow),(s,\downarrow)$	$(s,\uparrow),(s,\downarrow)$
M_2	$(s,\uparrow),(s,\downarrow)$	$(p_x,\uparrow),(p_x,\downarrow),(p_y,\uparrow),(p_y,\downarrow),(p_z,\uparrow),(p_z,\downarrow)$
M_3	$(p_x,\uparrow),(p_x,\downarrow),(p_y,\uparrow),(p_y,\downarrow),(p_z,\uparrow),(p_z,\downarrow)$	$(p_x,\uparrow),(p_x,\downarrow),(p_y,\uparrow),(p_y,\downarrow),(p_z,\uparrow),(p_z,\downarrow)$
M_4	$(p_x,\uparrow),(p_x,\downarrow),(p_y,\uparrow),(p_y,\downarrow),(p_z,\uparrow),(p_z,\downarrow)$	$(s,\uparrow),(s,\downarrow)$

Table 5: Atomic SAMB.

symbol	type	group	form
$\mathbb{X}_1$	$\mathbb{Q}_0^{(a,A_g)}$	M_1	$\begin{pmatrix} \frac{\sqrt{2}}{2} & 0 \\ 0 & \frac{\sqrt{2}}{2} \end{pmatrix}$
$\mathbb{X}_2$	$\mathbb{M}_{1,0}^{(a,T_g)}(1,-1)$	M_1	$\begin{pmatrix} 0 & \frac{\sqrt{2}}{2} \\ \frac{\sqrt{2}}{2} & 0 \end{pmatrix}$
$\mathbb{X}_3$	$\mathbb{M}_{1,1}^{(a,T_g)}(1,-1)$	M_1	$\begin{pmatrix} 0 & -\frac{\sqrt{2}i}{2} \\ \frac{\sqrt{2}i}{2} & 0 \end{pmatrix}$

continued ...

Table 5

symbol	type	group	form
$\mathbb{X}_4$	$\mathbb{M}_{1,2}^{(a,T_g)}(1,-1)$	M_1	$\begin{pmatrix} \frac{\sqrt{2}}{2} & 0 \\ 0 & -\frac{\sqrt{2}}{2} \end{pmatrix}$
$\mathbb{X}_5$	$\mathbb{Q}_{1,0}^{(a,T_u)}$	M_2	$\begin{pmatrix} \frac{\sqrt{2}}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}}{2} & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_6$	$\mathbb{Q}_{1,1}^{(a,T_u)}$	M_2	$\begin{pmatrix} 0 & 0 & \frac{\sqrt{2}}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}}{2} & 0 & 0 \end{pmatrix}$
$\mathbb{X}_7$	$\mathbb{Q}_{1,2}^{(a,T_u)}$	M_2	$\begin{pmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{2} \end{pmatrix}$
$\mathbb{X}_8$	$\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)$	M_2	$\begin{pmatrix} 0 & 0 & -\frac{i}{2} & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 0 & \frac{i}{2} & -\frac{1}{2} & 0 \end{pmatrix}$
$\mathbb{X}_9$	$\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)$	M_2	$\begin{pmatrix} \frac{i}{2} & 0 & 0 & 0 & 0 & -\frac{i}{2} \\ 0 & -\frac{i}{2} & 0 & 0 & -\frac{i}{2} & 0 \end{pmatrix}$
$\mathbb{X}_{10}$	$\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)$	M_2	$\begin{pmatrix} 0 & -\frac{1}{2} & 0 & \frac{i}{2} & 0 & 0 \\ \frac{1}{2} & 0 & \frac{i}{2} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{11}$	$\mathbb{G}_{2,0}^{(a,T_u)}(1,-1)$	M_2	$\begin{pmatrix} 0 & 0 & \frac{i}{2} & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 0 & -\frac{i}{2} & -\frac{1}{2} & 0 \end{pmatrix}$
$\mathbb{X}_{12}$	$\mathbb{G}_{2,1}^{(a,T_u)}(1,-1)$	M_2	$\begin{pmatrix} \frac{i}{2} & 0 & 0 & 0 & 0 & \frac{i}{2} \\ 0 & -\frac{i}{2} & 0 & 0 & \frac{i}{2} & 0 \end{pmatrix}$
$\mathbb{X}_{13}$	$\mathbb{G}_{2,2}^{(a,T_u)}(1,-1)$	M_2	$\begin{pmatrix} 0 & \frac{1}{2} & 0 & \frac{i}{2} & 0 & 0 \\ -\frac{1}{2} & 0 & \frac{i}{2} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{14}$	$\mathbb{G}_0^{(a,A_u)}(1,1)$	M_2	$\begin{pmatrix} 0 & \frac{\sqrt{6}i}{6} & 0 & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}i}{6} & 0 \\ \frac{\sqrt{6}i}{6} & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{6}i}{6} \end{pmatrix}$
$\mathbb{X}_{15}$	$\mathbb{Q}_0^{(a,A_g)}$	M_3	$\begin{pmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} \end{pmatrix}$

continued …

Table 5

symbol	type	group	form
$\mathbb{X}_{16}$	$\mathbb{Q}_0^{(a,A_g)}(1,1)$	M_3	$\begin{pmatrix} 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}}{6} & 0 \\ \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 \\ 0 & -\frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 \\ \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{17}$	$\mathbb{Q}_{2,0}^{(a,E_g)}$	M_3	$\begin{pmatrix} -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{3} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{3} \end{pmatrix}$
$\mathbb{X}_{18}$	$\mathbb{Q}_{2,1}^{(a,E_g)}$	M_3	$\begin{pmatrix} \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{2} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{19}$	$\mathbb{Q}_{2,0}^{(a,T_g)}$	M_3	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{2} & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{20}$	$\mathbb{Q}_{2,1}^{(a,T_g)}$	M_3	$\begin{pmatrix} 0 & 0 & 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \end{pmatrix}$

continued ...

Table 5

symbol	type	group	form
$\mathbb{X}_{21}$	$\mathbb{Q}_{2,2}^{(a,T_g)}$	M_3	$\begin{pmatrix} 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{2} & 0 & 0 \\ \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{22}$	$\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)$	M_3	$\begin{pmatrix} 0 & 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & 0 & 0 & \frac{\sqrt{6}i}{6} & \frac{\sqrt{6}}{12} & 0 \\ \frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{12} \\ 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & \frac{\sqrt{6}i}{12} & 0 \\ 0 & \frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 \\ -\frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{23}$	$\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)$	M_3	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{24}$	$\mathbb{Q}_{2,0}^{(a,T_g)}(1,-1)$	M_3	$\begin{pmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & \frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{25}$	$\mathbb{Q}_{2,1}^{(a,T_g)}(1,-1)$	M_3	$\begin{pmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \end{pmatrix}$

continued ...

Table 5

symbol	type	group	form
$\mathbb{X}_{26}$	$\mathbb{Q}_{2,2}^{(a,T_g)}(1,-1)$	M_3	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{27}$	$\mathbb{G}_{1,0}^{(a,T_g)}(1,0)$	M_3	$\begin{pmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{28}$	$\mathbb{G}_{1,1}^{(a,T_g)}(1,0)$	M_3	$\begin{pmatrix} 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{29}$	$\mathbb{G}_{1,2}^{(a,T_g)}(1,0)$	M_3	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{30}$	$\mathbb{M}_{1,0}^{(a,T_g)}$	M_3	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{i}{2} \\ 0 & 0 & \frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{2} & 0 & 0 \end{pmatrix}$

continued ...

Table 5

symbol	type	group	form
$\mathbb{X}_{31}$	$\mathbb{M}_{1,1}^{(a,T_g)}$	M_3	$\begin{pmatrix} 0 & 0 & 0 & 0 & \frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{i}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{i}{2} & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{32}$	$\mathbb{M}_{1,2}^{(a,T_g)}$	M_3	$\begin{pmatrix} 0 & 0 & -\frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{i}{2} & 0 & 0 \\ \frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{33}$	$\mathbb{M}_{1,0}^{(a,T_g)}(1,1)$	M_3	$\begin{pmatrix} 0 & \frac{\sqrt{30}}{15} & 0 & -\frac{\sqrt{30}i}{20} & \frac{\sqrt{30}}{20} & 0 \\ \frac{\sqrt{30}}{15} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{30}}{20} \\ 0 & -\frac{\sqrt{30}i}{20} & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 \\ \frac{\sqrt{30}i}{20} & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 & 0 \\ \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{30} \\ 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & -\frac{\sqrt{30}}{30} & 0 \end{pmatrix}$
$\mathbb{X}_{34}$	$\mathbb{M}_{1,1}^{(a,T_g)}(1,1)$	M_3	$\begin{pmatrix} 0 & \frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{20} & 0 & 0 \\ -\frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{30}i}{15} & \frac{\sqrt{30}}{20} & 0 \\ \frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{15} & 0 & 0 & -\frac{\sqrt{30}}{20} \\ 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & \frac{\sqrt{30}i}{30} \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{20} & -\frac{\sqrt{30}i}{30} & 0 \end{pmatrix}$
$\mathbb{X}_{35}$	$\mathbb{M}_{1,2}^{(a,T_g)}(1,1)$	M_3	$\begin{pmatrix} -\frac{\sqrt{30}}{30} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} \\ 0 & \frac{\sqrt{30}}{30} & 0 & 0 & \frac{\sqrt{30}}{20} & 0 \\ 0 & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 & -\frac{\sqrt{30}i}{20} \\ 0 & 0 & 0 & \frac{\sqrt{30}}{30} & \frac{\sqrt{30}i}{20} & 0 \\ 0 & \frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{30}i}{20} & \frac{\sqrt{30}}{15} & 0 \\ \frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{30}}{15} \end{pmatrix}$

continued ...

Table 5

symbol	type	group	form
$\mathbb{X}_{36}$	$\mathbb{M}_{1,0}^{(a,T_g)}(1,-1)$	M_3	$\begin{pmatrix} 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \end{pmatrix}$
$\mathbb{X}_{37}$	$\mathbb{M}_{1,1}^{(a,T_g)}(1,-1)$	M_3	$\begin{pmatrix} 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}i}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{6} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{6} & 0 \end{pmatrix}$
$\mathbb{X}_{38}$	$\mathbb{M}_{1,2}^{(a,T_g)}(1,-1)$	M_3	$\begin{pmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{6} \end{pmatrix}$
$\mathbb{X}_{39}$	$\mathbb{M}_{3,0}^{(a,T_g,1)}(1,-1)$	M_3	$\begin{pmatrix} 0 & \frac{\sqrt{5}}{5} & 0 & \frac{\sqrt{5}i}{10} & -\frac{\sqrt{5}}{10} & 0 \\ \frac{\sqrt{5}}{5} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & \frac{\sqrt{5}}{10} \\ 0 & \frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 \\ -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 \\ -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} \\ 0 & \frac{\sqrt{5}}{10} & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 \end{pmatrix}$
$\mathbb{X}_{40}$	$\mathbb{M}_{3,1}^{(a,T_g,1)}(1,-1)$	M_3	$\begin{pmatrix} 0 & \frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 \\ -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{5}i}{5} & -\frac{\sqrt{5}}{10} & 0 \\ -\frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{5}i}{5} & 0 & 0 & \frac{\sqrt{5}}{10} \\ 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{5}i}{10} \\ 0 & 0 & 0 & \frac{\sqrt{5}}{10} & -\frac{\sqrt{5}i}{10} & 0 \end{pmatrix}$

continued ...

Table 5

symbol	type	group	form
$\mathbb{X}_{41}$	$\mathbb{M}_{3,2}^{(a,T_g,1)}(1,-1)$	M_3	$\begin{pmatrix} -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} \\ 0 & \frac{\sqrt{5}}{10} & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 \\ 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{5}i}{10} \\ 0 & 0 & 0 & \frac{\sqrt{5}}{10} & -\frac{\sqrt{5}i}{10} & 0 \\ 0 & -\frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{5}i}{10} & \frac{\sqrt{5}}{5} & 0 \\ -\frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & -\frac{\sqrt{5}}{5} \end{pmatrix}$
$\mathbb{X}_{42}$	$\mathbb{M}_{3,0}^{(a,T_g,2)}(1,-1)$	M_3	$\begin{pmatrix} 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}}{6} & 0 \\ 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 \\ \frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} \\ 0 & \frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 \end{pmatrix}$
$\mathbb{X}_{43}$	$\mathbb{M}_{3,1}^{(a,T_g,2)}(1,-1)$	M_3	$\begin{pmatrix} 0 & \frac{\sqrt{3}i}{6} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 \\ -\frac{\sqrt{3}i}{6} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} \\ 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & \frac{\sqrt{3}i}{6} & 0 \end{pmatrix}$
$\mathbb{X}_{44}$	$\mathbb{M}_{3,2}^{(a,T_g,2)}(1,-1)$	M_3	$\begin{pmatrix} \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}i}{6} \\ 0 & 0 & 0 & \frac{\sqrt{3}}{6} & -\frac{\sqrt{3}i}{6} & 0 \\ 0 & \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 \\ \frac{\sqrt{3}}{6} & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{45}$	$\mathbb{T}_{2,0}^{(a,T_g)}(1,0)$	M_3	$\begin{pmatrix} 0 & 0 & 0 & \frac{\sqrt{6}i}{12} & \frac{\sqrt{6}}{12} & 0 \\ 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & \frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{6} \\ 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}}{6} & 0 \end{pmatrix}$

continued ...

Table 5

symbol	type	group	form
$\mathbb{X}_{46}$	$\mathbb{T}_{2,1}^{(a,T_g)}(1,0)$	M_3	$\begin{pmatrix} 0 & \frac{\sqrt{6}i}{6} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 \\ -\frac{\sqrt{6}i}{6} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 \\ \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} \\ 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}i}{6} \\ 0 & 0 & 0 & \frac{\sqrt{6}}{12} & \frac{\sqrt{6}i}{6} & 0 \end{pmatrix}$
$\mathbb{X}_{47}$	$\mathbb{T}_{2,2}^{(a,T_g)}(1,0)$	M_3	$\begin{pmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 \\ 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{6}i}{12} \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}i}{12} & 0 \\ 0 & -\frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 \\ -\frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{48}$	$\mathbb{Q}_{1,0}^{(a,T_u)}$	M_4	$\begin{pmatrix} \frac{\sqrt{2}}{2} & 0 \\ 0 & \frac{\sqrt{2}}{2} \\ 0 & 0 \\ 0 & 0 \\ 0 & 0 \\ 0 & 0 \end{pmatrix}$
$\mathbb{X}_{49}$	$\mathbb{Q}_{1,1}^{(a,T_u)}$	M_4	$\begin{pmatrix} 0 & 0 \\ 0 & 0 \\ \frac{\sqrt{2}}{2} & 0 \\ 0 & \frac{\sqrt{2}}{2} \\ 0 & 0 \\ 0 & 0 \end{pmatrix}$
$\mathbb{X}_{50}$	$\mathbb{Q}_{1,2}^{(a,T_u)}$	M_4	$\begin{pmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 0 \\ 0 & 0 \\ \frac{\sqrt{2}}{2} & 0 \\ 0 & \frac{\sqrt{2}}{2} \end{pmatrix}$

continued ...

Table 5

symbol	type	group	form
$\mathbb{X}_{51}$	$\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)$	M_4	$\begin{pmatrix} 0 & 0 \\ 0 & 0 \\ \frac{i}{2} & 0 \\ 0 & -\frac{i}{2} \\ 0 & -\frac{1}{2} \\ \frac{1}{2} & 0 \end{pmatrix}$
$\mathbb{X}_{52}$	$\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)$	M_4	$\begin{pmatrix} -\frac{i}{2} & 0 \\ 0 & \frac{i}{2} \\ 0 & 0 \\ 0 & 0 \\ 0 & \frac{i}{2} \\ \frac{i}{2} & 0 \end{pmatrix}$
$\mathbb{X}_{53}$	$\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)$	M_4	$\begin{pmatrix} 0 & \frac{1}{2} \\ -\frac{1}{2} & 0 \\ 0 & -\frac{i}{2} \\ -\frac{i}{2} & 0 \\ 0 & 0 \\ 0 & 0 \end{pmatrix}$
$\mathbb{X}_{54}$	$\mathbb{G}_{2,0}^{(a,T_u)}(1,-1)$	M_4	$\begin{pmatrix} 0 & 0 \\ 0 & 0 \\ -\frac{i}{2} & 0 \\ 0 & \frac{i}{2} \\ 0 & -\frac{1}{2} \\ \frac{1}{2} & 0 \end{pmatrix}$
$\mathbb{X}_{55}$	$\mathbb{G}_{2,1}^{(a,T_u)}(1,-1)$	M_4	$\begin{pmatrix} -\frac{i}{2} & 0 \\ 0 & \frac{i}{2} \\ 0 & 0 \\ 0 & 0 \\ 0 & -\frac{i}{2} \\ -\frac{i}{2} & 0 \end{pmatrix}$

continued ...

Table 5

symbol	type	group	form
$\mathbb{X}_{56}$	$\mathbb{G}_{2,2}^{(a,T_u)}(1,-1)$	M_4	$\begin{pmatrix} 0 & -\frac{1}{2} \\ \frac{1}{2} & 0 \\ 0 & -\frac{i}{2} \\ -\frac{i}{2} & 0 \\ 0 & 0 \\ 0 & 0 \end{pmatrix}$

Table 6: Uniform SAMB.

symbol	type	cluster	form
$\mathbb{U}_1$	$\mathbb{Q}_0^{(s,A_g)}$	S_1	$\begin{pmatrix} \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \end{pmatrix}$
$\mathbb{U}_2$	$\mathbb{Q}_{1,0}^{(s,T_u)}$	S_1	$\begin{pmatrix} \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \end{pmatrix}$

continued ...

Table 6

symbol	type	cluster	form
$\mathbb{U}_3$	$\mathbb{Q}_{1,1}^{(s,T_u)}$	S_1	$\begin{pmatrix} \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \end{pmatrix}$
$\mathbb{U}_4$	$\mathbb{Q}_{1,2}^{(s,T_u)}$	S_1	$\begin{pmatrix} \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \end{pmatrix}$
$\mathbb{U}_5$	$\mathbb{Q}_{2,0}^{(s,T_g)}$	S_1	$\begin{pmatrix} \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \end{pmatrix}$
$\mathbb{U}_6$	$\mathbb{Q}_{2,1}^{(s,T_g)}$	S_1	$\begin{pmatrix} \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \end{pmatrix}$

continued ...

Table 6

symbol	type	cluster	form
$\mathbb{U}_7$	$\mathbb{Q}_{2,2}^{(s,T_g)}$	S_1	$\begin{pmatrix} \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \end{pmatrix}$
$\mathbb{U}_8$	$\mathbb{Q}_3^{(s,A_u)}$	S_1	$\begin{pmatrix} \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \end{pmatrix}$
$\mathbb{U}_9$	$\mathbb{Q}_0^{(u,A_g)}$	B_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & \frac{\sqrt{6}}{12} & \frac{\sqrt{6}}{12} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}}{12} & \frac{\sqrt{6}}{12} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & \frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}}{12} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & \frac{\sqrt{6}}{12} & \frac{\sqrt{6}}{12} & 0 \\ 0 & \frac{\sqrt{6}}{12} & \frac{\sqrt{6}}{12} & \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}}{12} & \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}}{12} & \frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}}{12} & \frac{\sqrt{6}}{12} & \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{U}_{10}$	$\mathbb{Q}_{1,0}^{(u,T_u)}$	B_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{26}}{52} & 0 & \frac{\sqrt{26}}{26} \\ 0 & 0 & 0 & 0 & -\frac{3\sqrt{26}}{52} & 0 & -\frac{\sqrt{26}}{26} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{26}}{26} & 0 & \frac{3\sqrt{26}}{52} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{26}}{26} & 0 & -\frac{3\sqrt{26}}{52} & 0 \\ 0 & -\frac{3\sqrt{26}}{52} & 0 & -\frac{\sqrt{26}}{26} & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{26}}{52} & 0 & \frac{\sqrt{26}}{26} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{26}}{26} & 0 & -\frac{3\sqrt{26}}{52} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{26}}{26} & 0 & \frac{3\sqrt{26}}{52} & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$

continued ...

Table 6

symbol	type	cluster	form
$\mathbb{U}_{11}$	$\mathbb{Q}_{1,1}^{(u,T_u)}$	B_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{26}}{26} & \frac{3\sqrt{26}}{52} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{26}}{26} & 0 & 0 & -\frac{3\sqrt{26}}{52} \\ 0 & 0 & 0 & 0 & -\frac{3\sqrt{26}}{52} & 0 & 0 & -\frac{\sqrt{26}}{26} \\ 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{26}}{52} & \frac{\sqrt{26}}{26} & 0 \\ 0 & -\frac{\sqrt{26}}{26} & -\frac{3\sqrt{26}}{52} & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{26}}{26} & 0 & 0 & \frac{3\sqrt{26}}{52} & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{26}}{52} & 0 & 0 & \frac{\sqrt{26}}{26} & 0 & 0 & 0 & 0 \\ 0 & -\frac{3\sqrt{26}}{52} & -\frac{\sqrt{26}}{26} & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{U}_{12}$	$\mathbb{Q}_{1,2}^{(u,T_u)}$	B_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{26}}{26} & \frac{3\sqrt{26}}{52} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{26}}{52} & \frac{\sqrt{26}}{26} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{26}}{26} & -\frac{3\sqrt{26}}{52} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{3\sqrt{26}}{52} & -\frac{\sqrt{26}}{26} & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{26}}{26} & -\frac{3\sqrt{26}}{52} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{3\sqrt{26}}{52} & -\frac{\sqrt{26}}{26} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{26}}{26} & \frac{3\sqrt{26}}{52} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{26}}{52} & \frac{\sqrt{26}}{26} & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{U}_{13}$	$\mathbb{Q}_{2,0}^{(u,E_g)}$	B_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{11\sqrt{3}}{84} & -\frac{\sqrt{3}}{42} & \frac{13\sqrt{3}}{84} \\ 0 & 0 & 0 & 0 & -\frac{11\sqrt{3}}{84} & 0 & \frac{13\sqrt{3}}{84} & -\frac{\sqrt{3}}{42} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{42} & \frac{13\sqrt{3}}{84} & 0 & -\frac{11\sqrt{3}}{84} \\ 0 & 0 & 0 & 0 & \frac{13\sqrt{3}}{84} & -\frac{\sqrt{3}}{42} & -\frac{11\sqrt{3}}{84} & 0 \\ 0 & -\frac{11\sqrt{3}}{84} & -\frac{\sqrt{3}}{42} & \frac{13\sqrt{3}}{84} & 0 & 0 & 0 & 0 \\ -\frac{11\sqrt{3}}{84} & 0 & \frac{13\sqrt{3}}{84} & -\frac{\sqrt{3}}{42} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{3}}{42} & \frac{13\sqrt{3}}{84} & 0 & -\frac{11\sqrt{3}}{84} & 0 & 0 & 0 & 0 \\ \frac{13\sqrt{3}}{84} & -\frac{\sqrt{3}}{42} & -\frac{11\sqrt{3}}{84} & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{U}_{14}$	$\mathbb{Q}_{2,1}^{(u,E_g)}$	B_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & \frac{5}{28} & -\frac{2}{7} & \frac{3}{28} \\ 0 & 0 & 0 & 0 & \frac{5}{28} & 0 & \frac{3}{28} & -\frac{2}{7} \\ 0 & 0 & 0 & 0 & -\frac{2}{7} & \frac{3}{28} & 0 & \frac{5}{28} \\ 0 & 0 & 0 & 0 & \frac{3}{28} & -\frac{2}{7} & \frac{5}{28} & 0 \\ 0 & \frac{5}{28} & -\frac{2}{7} & \frac{3}{28} & 0 & 0 & 0 & 0 \\ \frac{5}{28} & 0 & \frac{3}{28} & -\frac{2}{7} & 0 & 0 & 0 & 0 \\ -\frac{2}{7} & \frac{3}{28} & 0 & \frac{5}{28} & 0 & 0 & 0 & 0 \\ \frac{3}{28} & -\frac{2}{7} & \frac{5}{28} & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$

continued ...

Table 6

symbol	type	cluster	form
$\mathbb{U}_{15}$	$\mathbb{Q}_{2,0}^{(u,T_g)}$	B_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{U}_{16}$	$\mathbb{Q}_{2,1}^{(u,T_g)}$	B_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{U}_{17}$	$\mathbb{Q}_{2,2}^{(u,T_g)}$	B_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{U}_{18}$	$\mathbb{Q}_{3,0}^{(u,T_u,1)}$	B_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{26}}{26} & 0 & -\frac{3\sqrt{26}}{52} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{26}}{26} & 0 & \frac{3\sqrt{26}}{52} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{26}}{52} & 0 & \frac{\sqrt{26}}{26} \\ 0 & 0 & 0 & 0 & \frac{3\sqrt{26}}{52} & 0 & -\frac{\sqrt{26}}{26} & 0 \\ 0 & -\frac{\sqrt{26}}{26} & 0 & \frac{3\sqrt{26}}{52} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{26}}{26} & 0 & -\frac{3\sqrt{26}}{52} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{3\sqrt{26}}{52} & 0 & -\frac{\sqrt{26}}{26} & 0 & 0 & 0 & 0 \\ -\frac{3\sqrt{26}}{52} & 0 & \frac{\sqrt{26}}{26} & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$

continued ...

Table 6

symbol	type	cluster	form
$\mathbb{U}_{19}$	$\mathbb{Q}_{3,1}^{(u,T_u,1)}$	B_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{26}}{52} & \frac{\sqrt{26}}{26} & 0 \\ 0 & 0 & 0 & 0 & \frac{3\sqrt{26}}{52} & 0 & 0 & -\frac{\sqrt{26}}{26} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{26}}{26} & 0 & 0 & \frac{3\sqrt{26}}{52} \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{26}}{26} & -\frac{3\sqrt{26}}{52} & 0 \\ 0 & \frac{3\sqrt{26}}{52} & -\frac{\sqrt{26}}{26} & 0 & 0 & 0 & 0 & 0 \\ -\frac{3\sqrt{26}}{52} & 0 & 0 & \frac{\sqrt{26}}{26} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{26}}{26} & 0 & 0 & -\frac{3\sqrt{26}}{52} & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{26}}{26} & \frac{3\sqrt{26}}{52} & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{U}_{20}$	$\mathbb{Q}_{3,2}^{(u,T_u,1)}$	B_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{26}}{52} & \frac{\sqrt{26}}{26} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{26}}{26} & -\frac{3\sqrt{26}}{52} \\ 0 & 0 & 0 & 0 & \frac{3\sqrt{26}}{52} & -\frac{\sqrt{26}}{26} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{26}}{26} & \frac{3\sqrt{26}}{52} & 0 & 0 \\ 0 & 0 & \frac{3\sqrt{26}}{52} & -\frac{\sqrt{26}}{26} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{26}}{26} & \frac{3\sqrt{26}}{52} & 0 & 0 & 0 & 0 \\ -\frac{3\sqrt{26}}{52} & \frac{\sqrt{26}}{26} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{26}}{26} & -\frac{3\sqrt{26}}{52} & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{U}_{21}$	$\mathbb{T}_{2,0}^{(u,T_g)}$	B_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{26}i}{26} & 0 & -\frac{3\sqrt{26}i}{52} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{26}i}{26} & 0 & \frac{3\sqrt{26}i}{52} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{26}i}{52} & 0 & -\frac{\sqrt{26}i}{26} \\ 0 & 0 & 0 & 0 & \frac{3\sqrt{26}i}{52} & 0 & \frac{\sqrt{26}i}{26} & 0 \\ 0 & -\frac{\sqrt{26}i}{26} & 0 & -\frac{3\sqrt{26}i}{52} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{26}i}{26} & 0 & \frac{3\sqrt{26}i}{52} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{3\sqrt{26}i}{52} & 0 & -\frac{\sqrt{26}i}{26} & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{26}i}{52} & 0 & \frac{\sqrt{26}i}{26} & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{U}_{22}$	$\mathbb{T}_{2,1}^{(u,T_g)}$	B_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{26}i}{52} & -\frac{\sqrt{26}i}{26} & 0 \\ 0 & 0 & 0 & 0 & \frac{3\sqrt{26}i}{52} & 0 & 0 & \frac{\sqrt{26}i}{26} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{26}i}{26} & 0 & 0 & \frac{3\sqrt{26}i}{52} \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{26}i}{26} & -\frac{3\sqrt{26}i}{52} & 0 \\ 0 & -\frac{3\sqrt{26}i}{52} & -\frac{\sqrt{26}i}{26} & 0 & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{26}i}{52} & 0 & 0 & \frac{\sqrt{26}i}{26} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{26}i}{26} & 0 & 0 & \frac{3\sqrt{26}i}{52} & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{26}i}{26} & -\frac{3\sqrt{26}i}{52} & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$

continued ...

Table 6

symbol	type	cluster	form
$\mathbb{U}_{23}$	$\mathbb{T}^{(u,T_g)}_{2,2}$	B_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{26}i}{52} & -\frac{\sqrt{26}i}{26} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{26}i}{26} & -\frac{3\sqrt{26}i}{52} \\ 0 & 0 & 0 & 0 & \frac{3\sqrt{26}i}{52} & \frac{\sqrt{26}i}{26} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{26}i}{26} & \frac{3\sqrt{26}i}{52} & 0 & 0 \\ 0 & 0 & -\frac{3\sqrt{26}i}{52} & -\frac{\sqrt{26}i}{26} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{26}i}{26} & -\frac{3\sqrt{26}i}{52} & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{26}i}{52} & \frac{\sqrt{26}i}{26} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{26}i}{26} & \frac{3\sqrt{26}i}{52} & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{U}_{24}$	$\mathbb{T}^{(u,T_g,1)}_{4,0}$	B_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{26}i}{52} & 0 & \frac{\sqrt{26}i}{26} \\ 0 & 0 & 0 & 0 & \frac{3\sqrt{26}i}{52} & 0 & -\frac{\sqrt{26}i}{26} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{26}i}{26} & 0 & -\frac{3\sqrt{26}i}{52} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{26}i}{26} & 0 & \frac{3\sqrt{26}i}{52} & 0 \\ 0 & -\frac{3\sqrt{26}i}{52} & 0 & \frac{\sqrt{26}i}{26} & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{26}i}{52} & 0 & -\frac{\sqrt{26}i}{26} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{26}i}{26} & 0 & -\frac{3\sqrt{26}i}{52} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{26}i}{26} & 0 & \frac{3\sqrt{26}i}{52} & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{U}_{25}$	$\mathbb{T}^{(u,T_g,1)}_{4,1}$	B_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{26}i}{26} & -\frac{3\sqrt{26}i}{52} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{26}i}{26} & 0 & 0 & \frac{3\sqrt{26}i}{52} \\ 0 & 0 & 0 & 0 & \frac{3\sqrt{26}i}{52} & 0 & 0 & -\frac{\sqrt{26}i}{26} \\ 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{26}i}{52} & \frac{\sqrt{26}i}{26} & 0 \\ 0 & \frac{\sqrt{26}i}{26} & -\frac{3\sqrt{26}i}{52} & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{26}i}{26} & 0 & 0 & \frac{3\sqrt{26}i}{52} & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{26}i}{52} & 0 & 0 & -\frac{\sqrt{26}i}{26} & 0 & 0 & 0 & 0 \\ 0 & -\frac{3\sqrt{26}i}{52} & \frac{\sqrt{26}i}{26} & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{U}_{26}$	$\mathbb{T}^{(u,T_g,1)}_{4,2}$	B_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{26}i}{26} & -\frac{3\sqrt{26}i}{52} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{26}i}{52} & \frac{\sqrt{26}i}{26} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{26}i}{26} & \frac{3\sqrt{26}i}{52} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{3\sqrt{26}i}{52} & -\frac{\sqrt{26}i}{26} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{26}i}{26} & -\frac{3\sqrt{26}i}{52} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{3\sqrt{26}i}{52} & \frac{\sqrt{26}i}{26} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{26}i}{26} & \frac{3\sqrt{26}i}{52} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{26}i}{52} & -\frac{\sqrt{26}i}{26} & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$

Table 7: Polar harmonics.

No.	symbol	rank	irrep.	mul.	comp.	form
1	$\mathbb{Q}_{0}^{(A_g)}$	0	A_g	–	–	1
2	$\mathbb{Q}_{1,0}^{(T_u)}$	1	T_u	–	0	x
3	$\mathbb{Q}_{1,1}^{(T_u)}$	1	T_u	–	1	y
4	$\mathbb{Q}_{1,2}^{(T_u)}$	1	T_u	–	2	z
5	$\mathbb{Q}_{2,0}^{(E_g)}$	2	E_g	–	0	$-\frac{x^2}{2}-\frac{y^2}{2}+z^2$
6	$\mathbb{Q}_{2,1}^{(E_g)}$	2	E_g	–	1	$\frac{\sqrt{3}\left(x^2-y^2\right)}{2}$
7	$\mathbb{Q}_{2,0}^{(T_g)}$	2	T_g	–	0	$\sqrt{3}yz$
8	$\mathbb{Q}_{2,1}^{(T_g)}$	2	T_g	–	1	$\sqrt{3}xz$
9	$\mathbb{Q}_{2,2}^{(T_g)}$	2	T_g	–	2	$\sqrt{3}xy$
10	$\mathbb{Q}_{3}^{(A_u)}$	3	A_u	–	–	$\sqrt{15}xyz$
11	$\mathbb{Q}_{3,0}^{(T_u,1)}$	3	T_u	1	0	$\frac{x\left(2x^2-3y^2-3z^2\right)}{2}$
12	$\mathbb{Q}_{3,1}^{(T_u,1)}$	3	T_u	1	1	$-\frac{y\left(3x^2-2y^2+3z^2\right)}{2}$
13	$\mathbb{Q}_{3,2}^{(T_u,1)}$	3	T_u	1	2	$-\frac{z\left(3x^2+3y^2-2z^2\right)}{2}$
14	$\mathbb{Q}_{4,0}^{(T_g,1)}$	4	T_g	1	0	$\frac{\sqrt{35}yz(y-z)(y+z)}{2}$
15	$\mathbb{Q}_{4,1}^{(T_g,1)}$	4	T_g	1	1	$-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$
16	$\mathbb{Q}_{4,2}^{(T_g,1)}$	4	T_g	1	2	$\frac{\sqrt{35}xy(x-y)(x+y)}{2}$

Table 8: Axial harmonics.

No.	symbol	rank	irrep.	mul.	comp.	form
1	$\mathbb{G}_{0}^{(A_u)}$	0	A_u	–	–	1
2	$\mathbb{G}_{1,0}^{(T_g)}$	1	T_g	–	0	X
3	$\mathbb{G}_{1,1}^{(T_g)}$	1	T_g	–	1	Y
4	$\mathbb{G}_{1,2}^{(T_g)}$	1	T_g	–	2	Z

continued ...

Table 8

No.	symbol	rank	irrep.	mul.	comp.	form
5	$\mathbb{G}_{2,0}^{(T_u)}$	2	T_u	–	0	$\sqrt{3}YZ$
6	$\mathbb{G}_{2,1}^{(T_u)}$	2	T_u	–	1	$\sqrt{3}XZ$
7	$\mathbb{G}_{2,2}^{(T_u)}$	2	T_u	–	2	$\sqrt{3}XY$
8	$\mathbb{G}_{3,0}^{(T_g,1)}$	3	T_g	1	0	$\frac{X\left(2X^2-3Y^2-3Z^2\right)}{2}$
9	$\mathbb{G}_{3,1}^{(T_g,1)}$	3	T_g	1	1	$-\frac{Y\left(3X^2-2Y^2+3Z^2\right)}{2}$
10	$\mathbb{G}_{3,2}^{(T_g,1)}$	3	T_g	1	2	$-\frac{Z\left(3X^2+3Y^2-2Z^2\right)}{2}$
11	$\mathbb{G}_{3,0}^{(T_g,2)}$	3	T_g	2	0	$\frac{\sqrt{15}X(Y-Z)(Y+Z)}{2}$
12	$\mathbb{G}_{3,1}^{(T_g,2)}$	3	T_g	2	1	$-\frac{\sqrt{15}Y(X-Z)(X+Z)}{2}$
13	$\mathbb{G}_{3,2}^{(T_g,2)}$	3	T_g	2	2	$\frac{\sqrt{15}Z(X-Y)(X+Y)}{2}$

- Group info.: Generator = $2_{001},\ 2_{010},\ 3^+_{111},\ -1$

Table 9: Conjugacy class.

rep. SO	symmetry operations
1	1
2_{001}	$2_{001},\ 2_{100},\ 2_{010}$
3^+_{111}	$3^+_{111},\ 3^+_{1-1-1},\ 3^+_{-11-1},\ 3^+_{-1-11}$
3^-_{111}	$3^-_{111},\ 3^-_{1-1-1},\ 3^-_{-11-1},\ 3^-_{-1-11}$
-1	-1
m_{001}	$\mathrm{m}_{001},\ \mathrm{m}_{100},\ \mathrm{m}_{010}$
-3^+_{111}	$-3^+_{111},\ -3^+_{1-1-1},\ -3^+_{-11-1},\ -3^+_{-1-11}$
-3^-_{111}	$-3^-_{111},\ -3^-_{1-1-1},\ -3^-_{-11-1},\ -3^-_{-1-11}$

Table 10: Symmetry operations.

No.	SO	No.	SO	No.	SO	No.	SO	No.	SO
1	1	2	2_{001}	3	2_{100}	4	2_{010}	5	3^{+}_{111}
6	3^{+}_{1-1-1}	7	3^{+}_{-11-1}	8	3^{+}_{-1-11}	9	3^{-}_{111}	10	3^{-}_{1-1-1}
11	3^{-}_{-11-1}	12	3^{-}_{-1-11}	13	-1	14	m_{001}	15	m_{100}
16	m_{010}	17	-3^{+}_{111}	18	-3^{+}_{1-1-1}	19	-3^{+}_{-11-1}	20	-3^{+}_{-1-11}
21	-3^{-}_{111}	22	-3^{-}_{1-1-1}	23	-3^{-}_{-11-1}	24	-3^{-}_{-1-11}		

Table 11: Character table.

	1	2_{001}	3^{+}_{111}	3^{-}_{111}	-1	m_{001}	-3^{+}_{111}	-3^{-}_{111}
A_g	1	1	1	1	1	1	1	1
$E_g^{(a)}$	1	1	ω^*	ω	1	1	ω^*	ω
$E_g^{(b)}$	1	1	ω	ω^*	1	1	ω	ω^*
T_g	3	-1	0	0	3	-1	0	0
A_u	1	1	1	1	-1	-1	-1	-1
$E_u^{(a)}$	1	1	ω^*	ω	-1	-1	$-\omega^*$	$-\omega$
$E_u^{(b)}$	1	1	ω	ω^*	-1	-1	$-\omega$	$-\omega^*$
T_u	3	-1	0	0	-3	1	0	0

Table 12: Parity conversion.

$\leftrightarrow$	$\leftrightarrow$	$\leftrightarrow$	$\leftrightarrow$	$\leftrightarrow$
A_g (A_u)	$E_g^{(a)}$ ($E_u^{(a)}$)	$E_g^{(b)}$ ($E_u^{(b)}$)	T_g (T_u)	A_u (A_g)
$E_u^{(a)}$ ($E_g^{(a)}$)	$E_u^{(b)}$ ($E_g^{(b)}$)	T_u (T_g)		

Table 13: Symmetric product, $[\Gamma \otimes \Gamma']_+$.

	A_g	$E_g^{(a)}$	$E_g^{(b)}$	T_g	A_u	$E_u^{(a)}$	$E_u^{(b)}$	T_u
A_g	A_g	$E_g^{(a)}$	$E_g^{(b)}$	T_g	A_u	$E_u^{(a)}$	$E_u^{(b)}$	T_u
$E_g^{(a)}$		$E_g^{(b)}$	A_g	T_g	$E_u^{(a)}$	$E_u^{(b)}$	A_u	T_u
$E_g^{(b)}$			$E_g^{(a)}$	T_g	$E_u^{(b)}$	A_u	$E_u^{(a)}$	T_u
T_g				$A_g + E_g^{(a)} + E_g^{(b)} + T_g$	T_u	T_u	T_u	$A_u + E_u^{(a)} + E_u^{(b)} + 2T_u$
A_u					A_g	$E_g^{(a)}$	$E_g^{(b)}$	T_g
$E_u^{(a)}$						$E_g^{(b)}$	A_g	T_g
$E_u^{(b)}$							$E_g^{(a)}$	T_g
T_u								$A_g + E_g^{(a)} + E_g^{(b)} + T_g$

Table 14: Anti-symmetric product, $[\Gamma \otimes \Gamma]_-$.

A_g	$E_g^{(a)}$	$E_g^{(b)}$	T_g	A_u	$E_u^{(a)}$	$E_u^{(b)}$	T_u
–	–	–	T_g	–	–	–	T_g

Table 15: Virtual-cluster sites.

No.	position	No.	position	No.	position	No.	position
1	$\begin{pmatrix} 3 & 2 & 1 \end{pmatrix}$	2	$\begin{pmatrix} -3 & -2 & 1 \end{pmatrix}$	3	$\begin{pmatrix} 3 & -2 & -1 \end{pmatrix}$	4	$\begin{pmatrix} -3 & 2 & -1 \end{pmatrix}$
5	$\begin{pmatrix} 1 & 3 & 2 \end{pmatrix}$	6	$\begin{pmatrix} -1 & -3 & 2 \end{pmatrix}$	7	$\begin{pmatrix} 1 & -3 & -2 \end{pmatrix}$	8	$\begin{pmatrix} -1 & 3 & -2 \end{pmatrix}$
9	$\begin{pmatrix} 2 & 1 & 3 \end{pmatrix}$	10	$\begin{pmatrix} -2 & 1 & -3 \end{pmatrix}$	11	$\begin{pmatrix} -2 & -1 & 3 \end{pmatrix}$	12	$\begin{pmatrix} 2 & -1 & -3 \end{pmatrix}$
13	$\begin{pmatrix} -3 & -2 & -1 \end{pmatrix}$	14	$\begin{pmatrix} 3 & 2 & -1 \end{pmatrix}$	15	$\begin{pmatrix} -3 & 2 & 1 \end{pmatrix}$	16	$\begin{pmatrix} 3 & -2 & 1 \end{pmatrix}$
17	$\begin{pmatrix} -1 & -3 & -2 \end{pmatrix}$	18	$\begin{pmatrix} 1 & 3 & -2 \end{pmatrix}$	19	$\begin{pmatrix} -1 & 3 & 2 \end{pmatrix}$	20	$\begin{pmatrix} 1 & -3 & 2 \end{pmatrix}$
21	$\begin{pmatrix} -2 & -1 & -3 \end{pmatrix}$	22	$\begin{pmatrix} 2 & -1 & 3 \end{pmatrix}$	23	$\begin{pmatrix} 2 & 1 & -3 \end{pmatrix}$	24	$\begin{pmatrix} -2 & 1 & 3 \end{pmatrix}$

Table 16: Virtual-cluster basis.

symbol	1	2	3	4	5	6	7	8	9	10
$\mathbb{Q}_0^{(A_g)}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$
	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$
	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$						
$\mathbb{Q}_{1,0}^{(T_u)}$	$\frac{3\sqrt{7}}{28}$	$-\frac{3\sqrt{7}}{28}$	$\frac{3\sqrt{7}}{28}$	$-\frac{3\sqrt{7}}{28}$	$\frac{\sqrt{7}}{28}$	$-\frac{\sqrt{7}}{28}$	$\frac{\sqrt{7}}{28}$	$-\frac{\sqrt{7}}{28}$	$\frac{\sqrt{7}}{14}$	$-\frac{\sqrt{7}}{14}$
	$-\frac{\sqrt{7}}{14}$	$\frac{\sqrt{7}}{14}$	$-\frac{3\sqrt{7}}{28}$	$\frac{3\sqrt{7}}{28}$	$-\frac{3\sqrt{7}}{28}$	$\frac{3\sqrt{7}}{28}$	$-\frac{\sqrt{7}}{28}$	$\frac{\sqrt{7}}{28}$	$-\frac{\sqrt{7}}{28}$	$\frac{\sqrt{7}}{28}$
	$-\frac{\sqrt{7}}{14}$	$\frac{\sqrt{7}}{14}$	$\frac{\sqrt{7}}{14}$	$-\frac{\sqrt{7}}{14}$						
$\mathbb{Q}_{1,1}^{(T_u)}$	$\frac{\sqrt{7}}{14}$	$-\frac{\sqrt{7}}{14}$	$-\frac{\sqrt{7}}{14}$	$\frac{\sqrt{7}}{14}$	$\frac{3\sqrt{7}}{28}$	$-\frac{3\sqrt{7}}{28}$	$-\frac{3\sqrt{7}}{28}$	$\frac{3\sqrt{7}}{28}$	$\frac{\sqrt{7}}{28}$	$\frac{\sqrt{7}}{28}$
	$-\frac{\sqrt{7}}{28}$	$-\frac{\sqrt{7}}{28}$	$-\frac{\sqrt{7}}{14}$	$\frac{\sqrt{7}}{14}$	$\frac{\sqrt{7}}{14}$	$-\frac{\sqrt{7}}{14}$	$-\frac{3\sqrt{7}}{28}$	$\frac{3\sqrt{7}}{28}$	$\frac{3\sqrt{7}}{28}$	$-\frac{3\sqrt{7}}{28}$
	$-\frac{\sqrt{7}}{28}$	$-\frac{\sqrt{7}}{28}$	$\frac{\sqrt{7}}{28}$	$\frac{\sqrt{7}}{28}$						
$\mathbb{Q}_{1,2}^{(T_u)}$	$\frac{\sqrt{7}}{28}$	$\frac{\sqrt{7}}{28}$	$-\frac{\sqrt{7}}{28}$	$-\frac{\sqrt{7}}{28}$	$\frac{\sqrt{7}}{14}$	$\frac{\sqrt{7}}{14}$	$-\frac{\sqrt{7}}{14}$	$-\frac{\sqrt{7}}{14}$	$\frac{3\sqrt{7}}{28}$	$-\frac{3\sqrt{7}}{28}$
	$\frac{3\sqrt{7}}{28}$	$-\frac{3\sqrt{7}}{28}$	$-\frac{\sqrt{7}}{28}$	$-\frac{\sqrt{7}}{28}$	$\frac{\sqrt{7}}{28}$	$\frac{\sqrt{7}}{28}$	$-\frac{\sqrt{7}}{14}$	$-\frac{\sqrt{7}}{14}$	$\frac{\sqrt{7}}{14}$	$\frac{\sqrt{7}}{14}$
	$-\frac{3\sqrt{7}}{28}$	$\frac{3\sqrt{7}}{28}$	$-\frac{3\sqrt{7}}{28}$	$\frac{3\sqrt{7}}{28}$						
$\mathbb{Q}_{2,0}^{(E_g)}$	$-\frac{11\sqrt{3}}{84}$	$-\frac{11\sqrt{3}}{84}$	$-\frac{11\sqrt{3}}{84}$	$-\frac{11\sqrt{3}}{84}$	$-\frac{\sqrt{3}}{42}$	$-\frac{\sqrt{3}}{42}$	$-\frac{\sqrt{3}}{42}$	$-\frac{\sqrt{3}}{42}$	$\frac{13\sqrt{3}}{84}$	$\frac{13\sqrt{3}}{84}$
	$\frac{13\sqrt{3}}{84}$	$\frac{13\sqrt{3}}{84}$	$-\frac{11\sqrt{3}}{84}$	$-\frac{11\sqrt{3}}{84}$	$-\frac{11\sqrt{3}}{84}$	$-\frac{11\sqrt{3}}{84}$	$-\frac{\sqrt{3}}{42}$	$-\frac{\sqrt{3}}{42}$	$-\frac{\sqrt{3}}{42}$	$-\frac{\sqrt{3}}{42}$
	$\frac{13\sqrt{3}}{84}$	$\frac{13\sqrt{3}}{84}$	$\frac{13\sqrt{3}}{84}$	$\frac{13\sqrt{3}}{84}$						
$\mathbb{Q}_{2,1}^{(E_g)}$	$\frac{5}{28}$	$\frac{5}{28}$	$\frac{5}{28}$	$\frac{5}{28}$	$-\frac{2}{7}$	$-\frac{2}{7}$	$-\frac{2}{7}$	$-\frac{2}{7}$	$\frac{3}{28}$	$\frac{3}{28}$
	$\frac{3}{28}$	$\frac{3}{28}$	$\frac{5}{28}$	$\frac{5}{28}$	$\frac{5}{28}$	$\frac{5}{28}$	$-\frac{2}{7}$	$-\frac{2}{7}$	$-\frac{2}{7}$	$-\frac{2}{7}$
	$\frac{3}{28}$	$\frac{3}{28}$	$\frac{3}{28}$	$\frac{3}{28}$						
$\mathbb{Q}_{2,0}^{(T_g)}$	$\frac{\sqrt{2}}{14}$	$-\frac{\sqrt{2}}{14}$	$\frac{\sqrt{2}}{14}$	$-\frac{\sqrt{2}}{14}$	$\frac{3\sqrt{2}}{14}$	$-\frac{3\sqrt{2}}{14}$	$\frac{3\sqrt{2}}{14}$	$-\frac{3\sqrt{2}}{14}$	$\frac{3\sqrt{2}}{28}$	$-\frac{3\sqrt{2}}{28}$
	$-\frac{3\sqrt{2}}{28}$	$\frac{3\sqrt{2}}{28}$	$\frac{\sqrt{2}}{14}$	$-\frac{\sqrt{2}}{14}$	$\frac{\sqrt{2}}{14}$	$-\frac{\sqrt{2}}{14}$	$\frac{3\sqrt{2}}{14}$	$-\frac{3\sqrt{2}}{14}$	$\frac{3\sqrt{2}}{14}$	$-\frac{3\sqrt{2}}{14}$
	$\frac{3\sqrt{2}}{28}$	$-\frac{3\sqrt{2}}{28}$	$-\frac{3\sqrt{2}}{28}$	$\frac{3\sqrt{2}}{28}$						
$\mathbb{Q}_{2,1}^{(T_g)}$	$\frac{3\sqrt{2}}{28}$	$-\frac{3\sqrt{2}}{28}$	$-\frac{3\sqrt{2}}{28}$	$\frac{3\sqrt{2}}{28}$	$\frac{\sqrt{2}}{14}$	$-\frac{\sqrt{2}}{14}$	$-\frac{\sqrt{2}}{14}$	$\frac{\sqrt{2}}{14}$	$\frac{3\sqrt{2}}{14}$	$\frac{3\sqrt{2}}{14}$
	$-\frac{3\sqrt{2}}{14}$	$-\frac{3\sqrt{2}}{14}$	$\frac{3\sqrt{2}}{28}$	$-\frac{3\sqrt{2}}{28}$	$-\frac{3\sqrt{2}}{28}$	$\frac{3\sqrt{2}}{28}$	$\frac{\sqrt{2}}{14}$	$-\frac{\sqrt{2}}{14}$	$-\frac{\sqrt{2}}{14}$	$\frac{\sqrt{2}}{14}$
	$\frac{3\sqrt{2}}{14}$	$\frac{3\sqrt{2}}{14}$	$-\frac{3\sqrt{2}}{14}$	$-\frac{3\sqrt{2}}{14}$						
$\mathbb{Q}_{2,2}^{(T_g)}$	$\frac{3\sqrt{2}}{14}$	$\frac{3\sqrt{2}}{14}$	$-\frac{3\sqrt{2}}{14}$	$-\frac{3\sqrt{2}}{14}$	$\frac{3\sqrt{2}}{28}$	$\frac{3\sqrt{2}}{28}$	$-\frac{3\sqrt{2}}{28}$	$-\frac{3\sqrt{2}}{28}$	$\frac{\sqrt{2}}{14}$	$-\frac{\sqrt{2}}{14}$
	$\frac{\sqrt{2}}{14}$	$-\frac{\sqrt{2}}{14}$	$\frac{3\sqrt{2}}{14}$	$\frac{3\sqrt{2}}{14}$	$-\frac{3\sqrt{2}}{14}$	$-\frac{3\sqrt{2}}{14}$	$\frac{3\sqrt{2}}{28}$	$\frac{3\sqrt{2}}{28}$	$-\frac{3\sqrt{2}}{28}$	$-\frac{3\sqrt{2}}{28}$
	$\frac{\sqrt{2}}{14}$	$-\frac{\sqrt{2}}{14}$	$\frac{\sqrt{2}}{14}$	$-\frac{\sqrt{2}}{14}$						
$\mathbb{Q}_3^{(A_u)}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$
	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$

continued ...

Table 16

symbol	1	2	3	4	5	6	7	8	9	10
	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$						
$\mathbb{Q}_{3,0}^{(T_u,1)}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$
	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$
	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$						
$\mathbb{Q}_{3,1}^{(T_u,1)}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$
	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$
	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$						
$\mathbb{Q}_{3,2}^{(T_u,1)}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$
	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$
	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$						
$\mathbb{Q}_{3,0}^{(T_u,2)}$	$\frac{\sqrt{21}}{84}$	$-\frac{\sqrt{21}}{84}$	$\frac{\sqrt{21}}{84}$	$-\frac{\sqrt{21}}{84}$	$\frac{5\sqrt{21}}{84}$	$-\frac{5\sqrt{21}}{84}$	$\frac{5\sqrt{21}}{84}$	$-\frac{5\sqrt{21}}{84}$	$-\frac{\sqrt{21}}{21}$	$\frac{\sqrt{21}}{21}$
	$\frac{\sqrt{21}}{21}$	$-\frac{\sqrt{21}}{21}$	$-\frac{\sqrt{21}}{84}$	$\frac{\sqrt{21}}{84}$	$-\frac{\sqrt{21}}{84}$	$\frac{\sqrt{21}}{84}$	$-\frac{5\sqrt{21}}{84}$	$\frac{5\sqrt{21}}{84}$	$-\frac{5\sqrt{21}}{84}$	$\frac{5\sqrt{21}}{84}$
	$\frac{\sqrt{21}}{21}$	$-\frac{\sqrt{21}}{21}$	$-\frac{\sqrt{21}}{21}$	$\frac{\sqrt{21}}{21}$						
$\mathbb{Q}_{3,1}^{(T_u,2)}$	$-\frac{\sqrt{21}}{21}$	$\frac{\sqrt{21}}{21}$	$\frac{\sqrt{21}}{21}$	$-\frac{\sqrt{21}}{21}$	$\frac{\sqrt{21}}{84}$	$-\frac{\sqrt{21}}{84}$	$-\frac{\sqrt{21}}{84}$	$\frac{\sqrt{21}}{84}$	$\frac{5\sqrt{21}}{84}$	$\frac{5\sqrt{21}}{84}$
	$-\frac{5\sqrt{21}}{84}$	$-\frac{5\sqrt{21}}{84}$	$\frac{\sqrt{21}}{21}$	$-\frac{\sqrt{21}}{21}$	$-\frac{\sqrt{21}}{21}$	$\frac{\sqrt{21}}{21}$	$-\frac{\sqrt{21}}{84}$	$\frac{\sqrt{21}}{84}$	$\frac{\sqrt{21}}{84}$	$-\frac{\sqrt{21}}{84}$
	$-\frac{5\sqrt{21}}{84}$	$-\frac{5\sqrt{21}}{84}$	$\frac{5\sqrt{21}}{84}$	$\frac{5\sqrt{21}}{84}$						
$\mathbb{Q}_{3,2}^{(T_u,2)}$	$\frac{5\sqrt{21}}{84}$	$\frac{5\sqrt{21}}{84}$	$-\frac{5\sqrt{21}}{84}$	$-\frac{5\sqrt{21}}{84}$	$-\frac{\sqrt{21}}{21}$	$-\frac{\sqrt{21}}{21}$	$\frac{\sqrt{21}}{21}$	$\frac{\sqrt{21}}{21}$	$\frac{\sqrt{21}}{84}$	$-\frac{\sqrt{21}}{84}$
	$\frac{\sqrt{21}}{84}$	$-\frac{\sqrt{21}}{84}$	$-\frac{5\sqrt{21}}{84}$	$-\frac{5\sqrt{21}}{84}$	$\frac{5\sqrt{21}}{84}$	$\frac{5\sqrt{21}}{84}$	$\frac{\sqrt{21}}{21}$	$\frac{\sqrt{21}}{21}$	$-\frac{\sqrt{21}}{21}$	$-\frac{\sqrt{21}}{21}$
	$-\frac{\sqrt{21}}{84}$	$\frac{\sqrt{21}}{84}$	$-\frac{\sqrt{21}}{84}$	$\frac{\sqrt{21}}{84}$						
$\mathbb{Q}_{4,0}^{(T_g,1)}$	$\frac{9\sqrt{829}}{23212}$	$-\frac{9\sqrt{829}}{23212}$	$\frac{9\sqrt{829}}{23212}$	$-\frac{9\sqrt{829}}{23212}$	$\frac{125\sqrt{829}}{23212}$	$-\frac{125\sqrt{829}}{23212}$	$\frac{125\sqrt{829}}{23212}$	$-\frac{125\sqrt{829}}{23212}$	$-\frac{64\sqrt{829}}{5803}$	$\frac{64\sqrt{829}}{5803}$
	$\frac{64\sqrt{829}}{5803}$	$-\frac{64\sqrt{829}}{5803}$	$\frac{9\sqrt{829}}{23212}$	$-\frac{9\sqrt{829}}{23212}$	$\frac{9\sqrt{829}}{23212}$	$-\frac{9\sqrt{829}}{23212}$	$\frac{125\sqrt{829}}{23212}$	$-\frac{125\sqrt{829}}{23212}$	$\frac{125\sqrt{829}}{23212}$	$-\frac{125\sqrt{829}}{23212}$
	$-\frac{64\sqrt{829}}{5803}$	$\frac{64\sqrt{829}}{5803}$	$\frac{64\sqrt{829}}{5803}$	$-\frac{64\sqrt{829}}{5803}$						
$\mathbb{Q}_{4,1}^{(T_g,1)}$	$-\frac{64\sqrt{829}}{5803}$	$\frac{64\sqrt{829}}{5803}$	$\frac{64\sqrt{829}}{5803}$	$-\frac{64\sqrt{829}}{5803}$	$\frac{9\sqrt{829}}{23212}$	$-\frac{9\sqrt{829}}{23212}$	$-\frac{9\sqrt{829}}{23212}$	$\frac{9\sqrt{829}}{23212}$	$\frac{125\sqrt{829}}{23212}$	$\frac{125\sqrt{829}}{23212}$
	$-\frac{125\sqrt{829}}{23212}$	$-\frac{125\sqrt{829}}{23212}$	$-\frac{64\sqrt{829}}{5803}$	$\frac{64\sqrt{829}}{5803}$	$\frac{64\sqrt{829}}{5803}$	$-\frac{64\sqrt{829}}{5803}$	$\frac{9\sqrt{829}}{23212}$	$-\frac{9\sqrt{829}}{23212}$	$-\frac{9\sqrt{829}}{23212}$	$\frac{9\sqrt{829}}{23212}$
	$\frac{125\sqrt{829}}{23212}$	$\frac{125\sqrt{829}}{23212}$	$-\frac{125\sqrt{829}}{23212}$	$-\frac{125\sqrt{829}}{23212}$						
$\mathbb{Q}_{4,2}^{(T_g,1)}$	$\frac{125\sqrt{829}}{23212}$	$\frac{125\sqrt{829}}{23212}$	$-\frac{125\sqrt{829}}{23212}$	$-\frac{125\sqrt{829}}{23212}$	$-\frac{64\sqrt{829}}{5803}$	$-\frac{64\sqrt{829}}{5803}$	$\frac{64\sqrt{829}}{5803}$	$\frac{64\sqrt{829}}{5803}$	$\frac{9\sqrt{829}}{23212}$	$-\frac{9\sqrt{829}}{23212}$
	$\frac{9\sqrt{829}}{23212}$	$-\frac{9\sqrt{829}}{23212}$	$\frac{125\sqrt{829}}{23212}$	$\frac{125\sqrt{829}}{23212}$	$-\frac{125\sqrt{829}}{23212}$	$-\frac{125\sqrt{829}}{23212}$	$-\frac{64\sqrt{829}}{5803}$	$-\frac{64\sqrt{829}}{5803}$	$\frac{64\sqrt{829}}{5803}$	$\frac{64\sqrt{829}}{5803}$
	$\frac{9\sqrt{829}}{23212}$	$-\frac{9\sqrt{829}}{23212}$	$\frac{9\sqrt{829}}{23212}$	$-\frac{9\sqrt{829}}{23212}$						
$\mathbb{Q}_{4,0}^{(T_g,2)}$	$\frac{39\sqrt{829}}{3316}$	$-\frac{39\sqrt{829}}{3316}$	$\frac{39\sqrt{829}}{3316}$	$-\frac{39\sqrt{829}}{3316}$	$-\frac{11\sqrt{829}}{3316}$	$\frac{11\sqrt{829}}{3316}$	$-\frac{11\sqrt{829}}{3316}$	$\frac{11\sqrt{829}}{3316}$	$-\frac{\sqrt{829}}{829}$	$\frac{\sqrt{829}}{829}$

continued ...

Table 16

symbol	1	2	3	4	5	6	7	8	9	10
	$\frac{\sqrt{829}}{829}$	$-\frac{\sqrt{829}}{829}$	$\frac{39\sqrt{829}}{3316}$	$-\frac{39\sqrt{829}}{3316}$	$\frac{39\sqrt{829}}{3316}$	$-\frac{39\sqrt{829}}{3316}$	$-\frac{11\sqrt{829}}{3316}$	$\frac{11\sqrt{829}}{3316}$	$-\frac{11\sqrt{829}}{3316}$	$\frac{11\sqrt{829}}{3316}$
	$-\frac{\sqrt{829}}{829}$	$\frac{\sqrt{829}}{829}$	$\frac{\sqrt{829}}{829}$	$-\frac{\sqrt{829}}{829}$						
$\mathbb{Q}_{4,1}^{(T_g,2)}$	$-\frac{\sqrt{829}}{829}$	$\frac{\sqrt{829}}{829}$	$\frac{\sqrt{829}}{829}$	$-\frac{\sqrt{829}}{829}$	$\frac{39\sqrt{829}}{3316}$	$-\frac{39\sqrt{829}}{3316}$	$-\frac{39\sqrt{829}}{3316}$	$\frac{39\sqrt{829}}{3316}$	$-\frac{11\sqrt{829}}{3316}$	$-\frac{11\sqrt{829}}{3316}$
	$\frac{11\sqrt{829}}{3316}$	$\frac{11\sqrt{829}}{3316}$	$-\frac{\sqrt{829}}{829}$	$\frac{\sqrt{829}}{829}$	$\frac{\sqrt{829}}{829}$	$-\frac{\sqrt{829}}{829}$	$\frac{39\sqrt{829}}{3316}$	$-\frac{39\sqrt{829}}{3316}$	$-\frac{39\sqrt{829}}{3316}$	$\frac{39\sqrt{829}}{3316}$
	$-\frac{11\sqrt{829}}{3316}$	$-\frac{11\sqrt{829}}{3316}$	$\frac{11\sqrt{829}}{3316}$	$\frac{11\sqrt{829}}{3316}$						
$\mathbb{Q}_{4,2}^{(T_g,2)}$	$-\frac{11\sqrt{829}}{3316}$	$-\frac{11\sqrt{829}}{3316}$	$\frac{11\sqrt{829}}{3316}$	$\frac{11\sqrt{829}}{3316}$	$-\frac{\sqrt{829}}{829}$	$-\frac{\sqrt{829}}{829}$	$\frac{\sqrt{829}}{829}$	$\frac{\sqrt{829}}{829}$	$\frac{39\sqrt{829}}{3316}$	$-\frac{39\sqrt{829}}{3316}$
	$\frac{39\sqrt{829}}{3316}$	$-\frac{39\sqrt{829}}{3316}$	$-\frac{11\sqrt{829}}{3316}$	$-\frac{11\sqrt{829}}{3316}$	$\frac{11\sqrt{829}}{3316}$	$\frac{11\sqrt{829}}{3316}$	$-\frac{\sqrt{829}}{829}$	$-\frac{\sqrt{829}}{829}$	$\frac{\sqrt{829}}{829}$	$\frac{\sqrt{829}}{829}$
	$\frac{39\sqrt{829}}{3316}$	$-\frac{39\sqrt{829}}{3316}$	$\frac{39\sqrt{829}}{3316}$	$-\frac{39\sqrt{829}}{3316}$						
$\mathbb{Q}_{5,0}^{(E_u)}$	$\frac{5}{28}$	$\frac{5}{28}$	$\frac{5}{28}$	$\frac{5}{28}$	$-\frac{2}{7}$	$-\frac{2}{7}$	$-\frac{2}{7}$	$-\frac{2}{7}$	$\frac{3}{28}$	$\frac{3}{28}$
	$\frac{3}{28}$	$\frac{3}{28}$	$-\frac{5}{28}$	$-\frac{5}{28}$	$-\frac{5}{28}$	$-\frac{5}{28}$	$\frac{2}{7}$	$\frac{2}{7}$	$\frac{2}{7}$	$\frac{2}{7}$
	$-\frac{3}{28}$	$-\frac{3}{28}$	$-\frac{3}{28}$	$-\frac{3}{28}$						
$\mathbb{Q}_{5,1}^{(E_u)}$	$\frac{11\sqrt{3}}{84}$	$\frac{11\sqrt{3}}{84}$	$\frac{11\sqrt{3}}{84}$	$\frac{11\sqrt{3}}{84}$	$\frac{\sqrt{3}}{42}$	$\frac{\sqrt{3}}{42}$	$\frac{\sqrt{3}}{42}$	$\frac{\sqrt{3}}{42}$	$-\frac{13\sqrt{3}}{84}$	$-\frac{13\sqrt{3}}{84}$
	$-\frac{13\sqrt{3}}{84}$	$-\frac{13\sqrt{3}}{84}$	$-\frac{11\sqrt{3}}{84}$	$-\frac{11\sqrt{3}}{84}$	$-\frac{11\sqrt{3}}{84}$	$-\frac{11\sqrt{3}}{84}$	$-\frac{\sqrt{3}}{42}$	$-\frac{\sqrt{3}}{42}$	$-\frac{\sqrt{3}}{42}$	$-\frac{\sqrt{3}}{42}$
	$\frac{13\sqrt{3}}{84}$	$\frac{13\sqrt{3}}{84}$	$\frac{13\sqrt{3}}{84}$	$\frac{13\sqrt{3}}{84}$						