

# SAMB for “Th1”

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- Group: No. 200  $T_h^1$   $Pm-3$  [ cubic ]
  - Associated point group: No. 29  $T_h$   $m-3$  [ cubic ]
  - Generation condition
    - model type: **tight\_binding**
    - time-reversal type: **electric**
    - irrep: [Ag]
    - spinful
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- Unit cell:
  - $a = 1.0$ ,  $b = 1.0$ ,  $c = 1.0$ ,  $\alpha = 90.0$ ,  $\beta = 90.0$ ,  $\gamma = 90.0$
- Lattice vectors:
  - $\mathbf{a}_1 = (1.0 \ 0 \ 0)$
  - $\mathbf{a}_2 = (0 \ 1.0 \ 0)$
  - $\mathbf{a}_3 = (0 \ 0 \ 1.0)$

Table 1: High-symmetry line:  $\Gamma$ -X.

	symbol	position		symbol	position
	$\Gamma$	$\begin{pmatrix} 0 & 0 & 0 \end{pmatrix}$		X	$\begin{pmatrix} \frac{1}{2} & 0 & 0 \end{pmatrix}$

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- Kets: dimension = 24

Table 2: Hilbert space for full matrix.

No.	ket	No.	ket	No.	ket	No.	ket	No.	ket
1	$(s, \uparrow)@A_1$	2	$(s, \downarrow)@A_1$	3	$(p_x, \uparrow)@A_1$	4	$(p_x, \downarrow)@A_1$	5	$(p_y, \uparrow)@A_1$
6	$(p_y, \downarrow)@A_1$	7	$(p_z, \uparrow)@A_1$	8	$(p_z, \downarrow)@A_1$				

- Sites in (primitive) unit cell:

Table 3: Site-clusters.

site	position	mapping
S <sub>1</sub> A <sub>1</sub>	$\begin{pmatrix} \frac{1}{2} & 0 & 0 \end{pmatrix}$	[1,2,3,4,13,14,15,16]
A <sub>2</sub>	$\begin{pmatrix} 0 & \frac{1}{2} & 0 \end{pmatrix}$	[5,6,7,8,17,18,19,20]
A <sub>3</sub>	$\begin{pmatrix} 0 & 0 & \frac{1}{2} \end{pmatrix}$	[9,10,11,12,21,22,23,24]

- Bonds in (primitive) unit cell:

Table 4: Bond-clusters.

bond	tail	head	$n$	#	$\mathbf{b@c}$	mapping
B <sub>1</sub> b <sub>1</sub>	A <sub>1</sub>	A <sub>2</sub>	1	1	$\begin{pmatrix} -\frac{1}{2} & \frac{1}{2} & 0 \end{pmatrix} @ \begin{pmatrix} \frac{1}{4} & \frac{1}{4} & 0 \end{pmatrix}$	[1,14]
b <sub>2</sub>	A <sub>1</sub>	A <sub>2</sub>	1	1	$\begin{pmatrix} \frac{1}{2} & -\frac{1}{2} & 0 \end{pmatrix} @ \begin{pmatrix} \frac{3}{4} & \frac{3}{4} & 0 \end{pmatrix}$	[2,13]
b <sub>3</sub>	A <sub>1</sub>	A <sub>2</sub>	1	1	$\begin{pmatrix} -\frac{1}{2} & -\frac{1}{2} & 0 \end{pmatrix} @ \begin{pmatrix} \frac{1}{4} & \frac{3}{4} & 0 \end{pmatrix}$	[3,16]
b <sub>4</sub>	A <sub>1</sub>	A <sub>2</sub>	1	1	$\begin{pmatrix} \frac{1}{2} & \frac{1}{2} & 0 \end{pmatrix} @ \begin{pmatrix} \frac{3}{4} & \frac{1}{4} & 0 \end{pmatrix}$	[4,15]
b <sub>5</sub>	A <sub>2</sub>	A <sub>3</sub>	1	1	$\begin{pmatrix} 0 & -\frac{1}{2} & \frac{1}{2} \end{pmatrix} @ \begin{pmatrix} 0 & \frac{1}{4} & \frac{1}{4} \end{pmatrix}$	[5,19]
b <sub>6</sub>	A <sub>2</sub>	A <sub>3</sub>	1	1	$\begin{pmatrix} 0 & \frac{1}{2} & \frac{1}{2} \end{pmatrix} @ \begin{pmatrix} 0 & \frac{3}{4} & \frac{1}{4} \end{pmatrix}$	[6,20]
b <sub>7</sub>	A <sub>2</sub>	A <sub>3</sub>	1	1	$\begin{pmatrix} 0 & \frac{1}{2} & -\frac{1}{2} \end{pmatrix} @ \begin{pmatrix} 0 & \frac{3}{4} & \frac{3}{4} \end{pmatrix}$	[7,17]
b <sub>8</sub>	A <sub>2</sub>	A <sub>3</sub>	1	1	$\begin{pmatrix} 0 & -\frac{1}{2} & -\frac{1}{2} \end{pmatrix} @ \begin{pmatrix} 0 & \frac{1}{4} & \frac{3}{4} \end{pmatrix}$	[8,18]

continued ...

Table 4

	bond	tail	head	$n$	#	$\mathbf{b@c}$	mapping
	b <sub>9</sub>	A <sub>1</sub>	A <sub>3</sub>	1	1	$\begin{pmatrix} -\frac{1}{2} & 0 & \frac{1}{2} \end{pmatrix} @ \begin{pmatrix} \frac{1}{4} & 0 & \frac{1}{4} \end{pmatrix}$	[-9,-22]
	b <sub>10</sub>	A <sub>1</sub>	A <sub>3</sub>	1	1	$\begin{pmatrix} \frac{1}{2} & 0 & -\frac{1}{2} \end{pmatrix} @ \begin{pmatrix} \frac{3}{4} & 0 & \frac{3}{4} \end{pmatrix}$	[-10,-21]
	b <sub>11</sub>	A <sub>1</sub>	A <sub>3</sub>	1	1	$\begin{pmatrix} \frac{1}{2} & 0 & \frac{1}{2} \end{pmatrix} @ \begin{pmatrix} \frac{3}{4} & 0 & \frac{1}{4} \end{pmatrix}$	[-11,-24]
	b <sub>12</sub>	A <sub>1</sub>	A <sub>3</sub>	1	1	$\begin{pmatrix} -\frac{1}{2} & 0 & -\frac{1}{2} \end{pmatrix} @ \begin{pmatrix} \frac{1}{4} & 0 & \frac{3}{4} \end{pmatrix}$	[-12,-23]
B <sub>2</sub>	b <sub>13</sub>	A <sub>1</sub>	A <sub>1</sub>	2	1	$\begin{pmatrix} 1 & 0 & 0 \end{pmatrix} @ \begin{pmatrix} 0 & 0 & 0 \end{pmatrix}$	[1,-2,3,-4,-13,14,-15,16]
	b <sub>14</sub>	A <sub>2</sub>	A <sub>2</sub>	2	1	$\begin{pmatrix} 0 & 1 & 0 \end{pmatrix} @ \begin{pmatrix} 0 & 0 & 0 \end{pmatrix}$	[5,-6,-7,8,-17,18,19,-20]
	b <sub>15</sub>	A <sub>3</sub>	A <sub>3</sub>	2	1	$\begin{pmatrix} 0 & 0 & 1 \end{pmatrix} @ \begin{pmatrix} 0 & 0 & 0 \end{pmatrix}$	[9,-10,11,-12,-21,22,-23,24]
B <sub>3</sub>	b <sub>16</sub>	A <sub>1</sub>	A <sub>1</sub>	2	2	$\begin{pmatrix} 0 & 1 & 0 \end{pmatrix} @ \begin{pmatrix} \frac{1}{2} & \frac{1}{2} & 0 \end{pmatrix}$	[1,-2,-3,4,-13,14,15,-16]
	b <sub>17</sub>	A <sub>2</sub>	A <sub>2</sub>	2	2	$\begin{pmatrix} 0 & 0 & 1 \end{pmatrix} @ \begin{pmatrix} 0 & \frac{1}{2} & \frac{1}{2} \end{pmatrix}$	[5,6,-7,-8,-17,-18,19,20]
	b <sub>18</sub>	A <sub>3</sub>	A <sub>3</sub>	2	2	$\begin{pmatrix} 1 & 0 & 0 \end{pmatrix} @ \begin{pmatrix} \frac{1}{2} & 0 & \frac{1}{2} \end{pmatrix}$	[9,-10,-11,12,-21,22,23,-24]
B <sub>4</sub>	b <sub>19</sub>	A <sub>1</sub>	A <sub>1</sub>	2	3	$\begin{pmatrix} 0 & 0 & 1 \end{pmatrix} @ \begin{pmatrix} \frac{1}{2} & 0 & \frac{1}{2} \end{pmatrix}$	[1,2,-3,-4,-13,-14,15,16]
	b <sub>20</sub>	A <sub>2</sub>	A <sub>2</sub>	2	3	$\begin{pmatrix} 1 & 0 & 0 \end{pmatrix} @ \begin{pmatrix} \frac{1}{2} & \frac{1}{2} & 0 \end{pmatrix}$	[5,-6,7,-8,-17,18,-19,20]
	b <sub>21</sub>	A <sub>3</sub>	A <sub>3</sub>	2	3	$\begin{pmatrix} 0 & 1 & 0 \end{pmatrix} @ \begin{pmatrix} 0 & \frac{1}{2} & \frac{1}{2} \end{pmatrix}$	[9,10,-11,-12,-21,-22,23,24]

- SAMB:

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

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

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

$$\boxed{\text{No. 2}} \quad \hat{\mathbb{Q}}_0^{(A_g)} [\mathbf{M}_3, \mathbf{S}_1]$$

$$\hat{\mathbb{Z}}_2 = \mathbb{X}_{14}[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{Y}_1[\mathbb{Q}_0^{(s,A_g)}]$$

$$\hat{\mathbb{Z}}_2(\mathbf{k}) = \mathbb{X}_{14}[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}]$$

$$\boxed{\text{No. 3}} \quad \hat{\mathbb{Q}}_0^{(A_g)}(1, 1) [\mathbb{M}_3, \mathbb{S}_1]$$

$$\hat{\mathbb{Z}}_3 = \mathbb{X}_{15}[\mathbb{Q}_0^{(a, A_g)}(1, 1)] \otimes \mathbb{Y}_1[\mathbb{Q}_0^{(s, A_g)}]$$

$$\hat{\mathbb{Z}}_3(\mathbf{k}) = \mathbb{X}_{15}[\mathbb{Q}_0^{(a, A_g)}(1, 1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s, A_g)}]$$

$$\boxed{\text{No. 4}} \quad \hat{\mathbb{Q}}_0^{(A_g)} [\mathbb{M}_3, \mathbb{S}_1]$$

$$\hat{\mathbb{Z}}_4 = \frac{\sqrt{2}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a, E_g)}] \otimes \mathbb{Y}_2[\mathbb{Q}_{2,0}^{(s, E_g)}]}{2} + \frac{\sqrt{2}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a, E_g)}] \otimes \mathbb{Y}_3[\mathbb{Q}_{2,1}^{(s, E_g)}]}{2}$$

$$\hat{\mathbb{Z}}_4(\mathbf{k}) = \frac{\sqrt{2}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a, E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s, E_g)}]}{2} + \frac{\sqrt{2}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a, E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s, E_g)}]}{2}$$

$$\boxed{\text{No. 5}} \quad \hat{\mathbb{G}}_3^{(A_g)} [\mathbb{M}_3, \mathbb{S}_1]$$

$$\hat{\mathbb{Z}}_5 = \frac{\sqrt{2}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a, E_g)}] \otimes \mathbb{Y}_3[\mathbb{Q}_{2,1}^{(s, E_g)}]}{2} - \frac{\sqrt{2}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a, E_g)}] \otimes \mathbb{Y}_2[\mathbb{Q}_{2,0}^{(s, E_g)}]}{2}$$

$$\hat{\mathbb{Z}}_5(\mathbf{k}) = \frac{\sqrt{2}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a, E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s, E_g)}]}{2} - \frac{\sqrt{2}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a, E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s, E_g)}]}{2}$$

$$\boxed{\text{No. 6}} \quad \hat{\mathbb{Q}}_0^{(A_g)}(1, -1) [\mathbb{M}_3, \mathbb{S}_1]$$

$$\hat{\mathbb{Z}}_6 = \frac{\sqrt{2}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a, E_g)}(1, -1)] \otimes \mathbb{Y}_2[\mathbb{Q}_{2,0}^{(s, E_g)}]}{2} + \frac{\sqrt{2}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a, E_g)}(1, -1)] \otimes \mathbb{Y}_3[\mathbb{Q}_{2,1}^{(s, E_g)}]}{2}$$

$$\hat{\mathbb{Z}}_6(\mathbf{k}) = \frac{\sqrt{2}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a, E_g)}(1, -1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s, E_g)}]}{2} + \frac{\sqrt{2}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a, E_g)}(1, -1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s, E_g)}]}{2}$$

$$\boxed{\text{No. 7}} \quad \hat{\mathbb{G}}_3^{(A_g)}(1, -1) [\mathbb{M}_3, \mathbb{S}_1]$$

$$\hat{\mathbb{Z}}_7 = \frac{\sqrt{2}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a, E_g)}(1, -1)] \otimes \mathbb{Y}_3[\mathbb{Q}_{2,1}^{(s, E_g)}]}{2} - \frac{\sqrt{2}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a, E_g)}(1, -1)] \otimes \mathbb{Y}_2[\mathbb{Q}_{2,0}^{(s, E_g)}]}{2}$$

$$\hat{\mathbb{Z}}_7(\mathbf{k}) = \frac{\sqrt{2}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a, E_g)}(1, -1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s, E_g)}]}{2} - \frac{\sqrt{2}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a, E_g)}(1, -1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s, E_g)}]}{2}$$

$$\boxed{\text{No. 8}} \quad \hat{Q}_0^{(A_g)} [M_1, B_1]$$

$$\hat{Z}_8 = \mathbb{X}_1 [Q_0^{(a, A_g)}] \otimes \mathbb{Y}_4 [Q_0^{(b, A_g)}]$$

$$\hat{Z}_8(\mathbf{k}) = \frac{\sqrt{3}\mathbb{X}_1 [Q_0^{(a, A_g)}] \otimes \mathbb{U}_4 [Q_0^{(u, A_g)}] \otimes \mathbb{F}_1 [Q_0^{(k, A_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_1 [Q_0^{(a, A_g)}] \otimes \mathbb{U}_5 [Q_{2,0}^{(u, E_g)}] \otimes \mathbb{F}_2 [Q_{2,0}^{(k, E_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_1 [Q_0^{(a, A_g)}] \otimes \mathbb{U}_6 [Q_{2,1}^{(u, E_g)}] \otimes \mathbb{F}_3 [Q_{2,1}^{(k, E_g)}]}{3}$$

$$\boxed{\text{No. 9}} \quad \hat{G}_3^{(A_g)} (1, -1) [M_1, B_1]$$

$$\hat{Z}_9 = \frac{\sqrt{3}\mathbb{X}_2 [M_{1,0}^{(a, T_g)} (1, -1)] \otimes \mathbb{Y}_{22} [T_{2,0}^{(b, T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_3 [M_{1,1}^{(a, T_g)} (1, -1)] \otimes \mathbb{Y}_{23} [T_{2,1}^{(b, T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_4 [M_{1,2}^{(a, T_g)} (1, -1)] \otimes \mathbb{Y}_{24} [T_{2,2}^{(b, T_g)}]}{3}$$

$$\begin{aligned} \hat{Z}_9(\mathbf{k}) = & \frac{\mathbb{X}_2 [M_{1,0}^{(a, T_g)} (1, -1)] \otimes \mathbb{U}_7 [T_0^{(u, A_g)}] \otimes \mathbb{F}_4 [Q_{2,0}^{(k, T_g)}]}{3} - \frac{\sqrt{2}\mathbb{X}_2 [M_{1,0}^{(a, T_g)} (1, -1)] \otimes \mathbb{U}_8 [T_{2,0}^{(u, E_g)}] \otimes \mathbb{F}_4 [Q_{2,0}^{(k, T_g)}]}{21} - \frac{4\sqrt{6}\mathbb{X}_2 [M_{1,0}^{(a, T_g)} (1, -1)] \otimes \mathbb{U}_9 [T_{2,1}^{(u, E_g)}] \otimes \mathbb{F}_4 [Q_{2,0}^{(k, T_g)}]}{21} \\ & + \frac{\mathbb{X}_3 [M_{1,1}^{(a, T_g)} (1, -1)] \otimes \mathbb{U}_7 [T_0^{(u, A_g)}] \otimes \mathbb{F}_5 [Q_{2,1}^{(k, T_g)}]}{3} + \frac{13\sqrt{2}\mathbb{X}_3 [M_{1,1}^{(a, T_g)} (1, -1)] \otimes \mathbb{U}_8 [T_{2,0}^{(u, E_g)}] \otimes \mathbb{F}_5 [Q_{2,1}^{(k, T_g)}]}{42} + \frac{\sqrt{6}\mathbb{X}_3 [M_{1,1}^{(a, T_g)} (1, -1)] \otimes \mathbb{U}_9 [T_{2,1}^{(u, E_g)}] \otimes \mathbb{F}_5 [Q_{2,1}^{(k, T_g)}]}{14} \\ & + \frac{\mathbb{X}_4 [M_{1,2}^{(a, T_g)} (1, -1)] \otimes \mathbb{U}_7 [T_0^{(u, A_g)}] \otimes \mathbb{F}_6 [Q_{2,2}^{(k, T_g)}]}{3} - \frac{11\sqrt{2}\mathbb{X}_4 [M_{1,2}^{(a, T_g)} (1, -1)] \otimes \mathbb{U}_8 [T_{2,0}^{(u, E_g)}] \otimes \mathbb{F}_6 [Q_{2,2}^{(k, T_g)}]}{42} + \frac{5\sqrt{6}\mathbb{X}_4 [M_{1,2}^{(a, T_g)} (1, -1)] \otimes \mathbb{U}_9 [T_{2,1}^{(u, E_g)}] \otimes \mathbb{F}_6 [Q_{2,2}^{(k, T_g)}]}{42} \end{aligned}$$

$$\boxed{\text{No. 10}} \quad \hat{Q}_0^{(A_g)} [M_2, B_1]$$

$$\hat{Z}_{10} = \frac{\sqrt{3}\mathbb{X}_5 [Q_{1,0}^{(a, T_u)}] \otimes \mathbb{Y}_5 [Q_{1,0}^{(b, T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_6 [Q_{1,1}^{(a, T_u)}] \otimes \mathbb{Y}_6 [Q_{1,1}^{(b, T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_7 [Q_{1,2}^{(a, T_u)}] \otimes \mathbb{Y}_7 [Q_{1,2}^{(b, T_u)}]}{3}$$

$$\begin{aligned} \hat{Z}_{10}(\mathbf{k}) = & -\frac{\mathbb{X}_5 [Q_{1,0}^{(a, T_u)}] \otimes \mathbb{U}_7 [T_0^{(u, A_g)}] \otimes \mathbb{F}_7 [T_{1,0}^{(k, T_u)}]}{3} + \frac{24\sqrt{2}\mathbb{X}_5 [Q_{1,0}^{(a, T_u)}] \otimes \mathbb{U}_8 [T_{2,0}^{(u, E_g)}] \otimes \mathbb{F}_{10} [T_{3,0}^{(k, T_u, 1)}]}{91} + \frac{47\sqrt{2}\mathbb{X}_5 [Q_{1,0}^{(a, T_u)}] \otimes \mathbb{U}_8 [T_{2,0}^{(u, E_g)}] \otimes \mathbb{F}_7 [T_{1,0}^{(k, T_u)}]}{546} \\ & - \frac{2\sqrt{6}\mathbb{X}_5 [Q_{1,0}^{(a, T_u)}] \otimes \mathbb{U}_9 [T_{2,1}^{(u, E_g)}] \otimes \mathbb{F}_{10} [T_{3,0}^{(k, T_u, 1)}]}{91} - \frac{19\sqrt{6}\mathbb{X}_5 [Q_{1,0}^{(a, T_u)}] \otimes \mathbb{U}_9 [T_{2,1}^{(u, E_g)}] \otimes \mathbb{F}_7 [T_{1,0}^{(k, T_u)}]}{182} - \frac{\mathbb{X}_6 [Q_{1,1}^{(a, T_u)}] \otimes \mathbb{U}_7 [T_0^{(u, A_g)}] \otimes \mathbb{F}_8 [T_{1,1}^{(k, T_u)}]}{3} \\ & - \frac{9\sqrt{2}\mathbb{X}_6 [Q_{1,1}^{(a, T_u)}] \otimes \mathbb{U}_8 [T_{2,0}^{(u, E_g)}] \otimes \mathbb{F}_{11} [T_{3,1}^{(k, T_u, 1)}]}{91} + \frac{31\sqrt{2}\mathbb{X}_6 [Q_{1,1}^{(a, T_u)}] \otimes \mathbb{U}_8 [T_{2,0}^{(u, E_g)}] \otimes \mathbb{F}_8 [T_{1,1}^{(k, T_u)}]}{273} + \frac{\sqrt{6}\mathbb{X}_6 [Q_{1,1}^{(a, T_u)}] \otimes \mathbb{U}_9 [T_{2,1}^{(u, E_g)}] \otimes \mathbb{F}_{11} [T_{3,1}^{(k, T_u, 1)}]}{7} \\ & + \frac{2\sqrt{6}\mathbb{X}_6 [Q_{1,1}^{(a, T_u)}] \otimes \mathbb{U}_9 [T_{2,1}^{(u, E_g)}] \otimes \mathbb{F}_8 [T_{1,1}^{(k, T_u)}]}{21} - \frac{\mathbb{X}_7 [Q_{1,2}^{(a, T_u)}] \otimes \mathbb{U}_7 [T_0^{(u, A_g)}] \otimes \mathbb{F}_9 [T_{1,2}^{(k, T_u)}]}{3} - \frac{15\sqrt{2}\mathbb{X}_7 [Q_{1,2}^{(a, T_u)}] \otimes \mathbb{U}_8 [T_{2,0}^{(u, E_g)}] \otimes \mathbb{F}_{12} [T_{3,2}^{(k, T_u, 1)}]}{91} \\ & - \frac{109\sqrt{2}\mathbb{X}_7 [Q_{1,2}^{(a, T_u)}] \otimes \mathbb{U}_8 [T_{2,0}^{(u, E_g)}] \otimes \mathbb{F}_9 [T_{1,2}^{(k, T_u)}]}{546} - \frac{11\sqrt{6}\mathbb{X}_7 [Q_{1,2}^{(a, T_u)}] \otimes \mathbb{U}_9 [T_{2,1}^{(u, E_g)}] \otimes \mathbb{F}_{12} [T_{3,2}^{(k, T_u, 1)}]}{91} + \frac{5\sqrt{6}\mathbb{X}_7 [Q_{1,2}^{(a, T_u)}] \otimes \mathbb{U}_9 [T_{2,1}^{(u, E_g)}] \otimes \mathbb{F}_9 [T_{1,2}^{(k, T_u)}]}{546} \end{aligned}$$

$$\boxed{\text{No. 11}} \quad \hat{Q}_4^{(A_g)} [M_2, B_1]$$

$$\hat{Z}_{11} = \frac{\sqrt{3}\mathbb{X}_5 [Q_{1,0}^{(a, T_u)}] \otimes \mathbb{Y}_{13} [Q_{3,0}^{(b, T_u, 1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_6 [Q_{1,1}^{(a, T_u)}] \otimes \mathbb{Y}_{14} [Q_{3,1}^{(b, T_u, 1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_7 [Q_{1,2}^{(a, T_u)}] \otimes \mathbb{Y}_{15} [Q_{3,2}^{(b, T_u, 1)}]}{3}$$

$$\begin{aligned}
\hat{Z}_{11}(\mathbf{k}) = & -\frac{\mathbb{X}_5[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{3} - \frac{73\sqrt{2}\mathbb{X}_5[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{546} + \frac{24\sqrt{2}\mathbb{X}_5[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{91} \\
& - \frac{47\sqrt{6}\mathbb{X}_5[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{546} - \frac{2\sqrt{6}\mathbb{X}_5[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{91} - \frac{\mathbb{X}_6[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{3} \\
& + \frac{107\sqrt{2}\mathbb{X}_6[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{546} - \frac{9\sqrt{2}\mathbb{X}_6[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{91} - \frac{\sqrt{6}\mathbb{X}_6[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{42} \\
& + \frac{\sqrt{6}\mathbb{X}_6[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{7} - \frac{\mathbb{X}_7[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{3} - \frac{17\sqrt{2}\mathbb{X}_7[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{273} \\
& - \frac{15\sqrt{2}\mathbb{X}_7[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{91} + \frac{10\sqrt{6}\mathbb{X}_7[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{91} - \frac{11\sqrt{6}\mathbb{X}_7[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{91}
\end{aligned}$$

$$\boxed{\text{No. 12}} \quad \hat{\mathbb{Q}}_0^{(A_g)}(1,0) [\text{M}_2, \text{B}_1]$$

$$\begin{aligned}
\hat{Z}_{12} = & \frac{\sqrt{3}\mathbb{X}_{10}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{Y}_7[\mathbb{Q}_{1,2}^{(b,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_8[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{Y}_5[\mathbb{Q}_{1,0}^{(b,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_9[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{Y}_6[\mathbb{Q}_{1,1}^{(b,T_u)}]}{3} \\
\hat{Z}_{12}(\mathbf{k}) = & -\frac{\mathbb{X}_{10}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{3} - \frac{15\sqrt{2}\mathbb{X}_{10}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{91} \\
& - \frac{109\sqrt{2}\mathbb{X}_{10}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{546} - \frac{11\sqrt{6}\mathbb{X}_{10}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{91} \\
& + \frac{5\sqrt{6}\mathbb{X}_{10}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{546} - \frac{\mathbb{X}_8[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{3} + \frac{24\sqrt{2}\mathbb{X}_8[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{91} \\
& + \frac{47\sqrt{2}\mathbb{X}_8[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{546} - \frac{2\sqrt{6}\mathbb{X}_8[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{91} \\
& - \frac{19\sqrt{6}\mathbb{X}_8[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{182} - \frac{\mathbb{X}_9[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{3} - \frac{9\sqrt{2}\mathbb{X}_9[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{91} \\
& + \frac{31\sqrt{2}\mathbb{X}_9[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{273} + \frac{\sqrt{6}\mathbb{X}_9[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{7} + \frac{2\sqrt{6}\mathbb{X}_9[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{21}
\end{aligned}$$

$$\boxed{\text{No. 13}} \quad \hat{\mathbb{Q}}_4^{(A_g)}(1,0) [\text{M}_2, \text{B}_1]$$

$$\hat{Z}_{13} = \frac{\sqrt{3}\mathbb{X}_{10}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{Y}_{15}[\mathbb{Q}_{3,2}^{(b,T_u,1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_8[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{Y}_{13}[\mathbb{Q}_{3,0}^{(b,T_u,1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_9[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{Y}_{14}[\mathbb{Q}_{3,1}^{(b,T_u,1)}]}{3}$$

$$\begin{aligned}
\hat{Z}_{13}(\mathbf{k}) = & -\frac{\mathbb{X}_{10}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{3} - \frac{17\sqrt{2}\mathbb{X}_{10}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{273} \\
& - \frac{15\sqrt{2}\mathbb{X}_{10}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{91} + \frac{10\sqrt{6}\mathbb{X}_{10}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{91} \\
& - \frac{11\sqrt{6}\mathbb{X}_{10}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{91} - \frac{\mathbb{X}_8[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{3} \\
& - \frac{73\sqrt{2}\mathbb{X}_8[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{546} + \frac{24\sqrt{2}\mathbb{X}_8[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{91} \\
& - \frac{47\sqrt{6}\mathbb{X}_8[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{546} - \frac{2\sqrt{6}\mathbb{X}_8[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{91} \\
& - \frac{\mathbb{X}_9[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{546} + \frac{107\sqrt{2}\mathbb{X}_9[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{91} \\
& - \frac{9\sqrt{2}\mathbb{X}_9[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{91} - \frac{\sqrt{6}\mathbb{X}_9[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{42} + \frac{\sqrt{6}\mathbb{X}_9[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{7}
\end{aligned}$$

$$\boxed{\text{No. 14}} \quad \hat{\mathbb{G}}_3^{(A_g)}(1, -1) [\mathbb{M}_2, \mathbb{B}_1]$$

$$\hat{Z}_{14} = \frac{\sqrt{3}\mathbb{X}_{11}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{Y}_{17}[\mathbb{T}_{1,0}^{(b,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{12}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{Y}_{18}[\mathbb{T}_{1,1}^{(b,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{13}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{Y}_{19}[\mathbb{T}_{1,2}^{(b,T_u)}]}{3}$$

$$\begin{aligned}
\hat{Z}_{14}(\mathbf{k}) = & \frac{\mathbb{X}_{11}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{3} - \frac{24\sqrt{2}\mathbb{X}_{11}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{91} \\
& - \frac{47\sqrt{2}\mathbb{X}_{11}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{546} + \frac{2\sqrt{6}\mathbb{X}_{11}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{91} \\
& + \frac{19\sqrt{6}\mathbb{X}_{11}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{182} + \frac{\mathbb{X}_{12}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{3} \\
& + \frac{9\sqrt{2}\mathbb{X}_{12}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{91} \\
& - \frac{31\sqrt{2}\mathbb{X}_{12}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{273} - \frac{\sqrt{6}\mathbb{X}_{12}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{7} \\
& - \frac{2\sqrt{6}\mathbb{X}_{12}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{21} + \frac{\mathbb{X}_{13}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{3} \\
& + \frac{15\sqrt{2}\mathbb{X}_{13}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{91} + \frac{109\sqrt{2}\mathbb{X}_{13}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{546} \\
& + \frac{11\sqrt{6}\mathbb{X}_{13}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{91} - \frac{5\sqrt{6}\mathbb{X}_{13}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{546}
\end{aligned}$$

$$\boxed{\text{No. 15}} \quad \hat{\mathbb{G}}_3^{(A_g)}(1, -1) [\mathbf{M}_2, \mathbf{B}_1]$$

$$\hat{\mathbf{Z}}_{15} = -\frac{\sqrt{3}\mathbb{X}_{11}[\mathbf{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{Y}_{25}[\mathbf{T}_{3,0}^{(b,T_u,1)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{12}[\mathbf{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{Y}_{26}[\mathbf{T}_{3,1}^{(b,T_u,1)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{13}[\mathbf{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{Y}_{27}[\mathbf{T}_{3,2}^{(b,T_u,1)}]}{3}$$

$$\begin{aligned} \hat{\mathbf{Z}}_{15}(\mathbf{k}) = & -\frac{\mathbb{X}_{11}[\mathbf{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_{10}[\mathbf{T}_{3,0}^{(k,T_u,1)}]}{3} - \frac{73\sqrt{2}\mathbb{X}_{11}[\mathbf{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbf{T}_{3,0}^{(k,T_u,1)}]}{546} \\ & + \frac{24\sqrt{2}\mathbb{X}_{11}[\mathbf{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbf{T}_{1,0}^{(k,T_u)}]}{91} - \frac{47\sqrt{6}\mathbb{X}_{11}[\mathbf{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbf{T}_{3,0}^{(k,T_u,1)}]}{546} \\ & - \frac{2\sqrt{6}\mathbb{X}_{11}[\mathbf{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbf{T}_{1,0}^{(k,T_u)}]}{91} - \frac{\mathbb{X}_{12}[\mathbf{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_{11}[\mathbf{T}_{3,1}^{(k,T_u,1)}]}{3} \\ & + \frac{107\sqrt{2}\mathbb{X}_{12}[\mathbf{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbf{T}_{3,1}^{(k,T_u,1)}]}{546} - \frac{9\sqrt{2}\mathbb{X}_{12}[\mathbf{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbf{T}_{1,1}^{(k,T_u)}]}{91} \\ & - \frac{\sqrt{6}\mathbb{X}_{12}[\mathbf{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbf{T}_{3,1}^{(k,T_u,1)}]}{42} + \frac{\sqrt{6}\mathbb{X}_{12}[\mathbf{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbf{T}_{1,1}^{(k,T_u)}]}{7} \\ & - \frac{\mathbb{X}_{13}[\mathbf{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_{12}[\mathbf{T}_{3,2}^{(k,T_u,1)}]}{3} - \frac{17\sqrt{2}\mathbb{X}_{13}[\mathbf{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbf{T}_{3,2}^{(k,T_u,1)}]}{273} \\ & - \frac{15\sqrt{2}\mathbb{X}_{13}[\mathbf{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbf{T}_{1,2}^{(k,T_u)}]}{91} + \frac{10\sqrt{6}\mathbb{X}_{13}[\mathbf{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbf{T}_{3,2}^{(k,T_u,1)}]}{91} \\ & - \frac{11\sqrt{6}\mathbb{X}_{13}[\mathbf{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbf{T}_{1,2}^{(k,T_u)}]}{91} \end{aligned}$$

$$\boxed{\text{No. 16}} \quad \hat{\mathbb{Q}}_0^{(A_g)} [\mathbf{M}_4, \mathbf{B}_1]$$

$$\hat{\mathbf{Z}}_{16} = \frac{\sqrt{3}\mathbb{X}_{50}[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{Y}_5[\mathbb{Q}_{1,0}^{(b,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{51}[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{Y}_6[\mathbb{Q}_{1,1}^{(b,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{52}[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{Y}_7[\mathbb{Q}_{1,2}^{(b,T_u)}]}{3}$$

$$\begin{aligned} \hat{\mathbf{Z}}_{16}(\mathbf{k}) = & -\frac{\mathbb{X}_{50}[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_7[\mathbf{T}_0^{(u,A_g)}] \otimes \mathbb{F}_7[\mathbf{T}_{1,0}^{(k,T_u)}]}{3} + \frac{24\sqrt{2}\mathbb{X}_{50}[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_8[\mathbf{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbf{T}_{3,0}^{(k,T_u,1)}]}{91} + \frac{47\sqrt{2}\mathbb{X}_{50}[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_8[\mathbf{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbf{T}_{1,0}^{(k,T_u)}]}{546} \\ & - \frac{2\sqrt{6}\mathbb{X}_{50}[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_9[\mathbf{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbf{T}_{3,0}^{(k,T_u,1)}]}{91} - \frac{19\sqrt{6}\mathbb{X}_{50}[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_9[\mathbf{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbf{T}_{1,0}^{(k,T_u)}]}{182} - \frac{\mathbb{X}_{51}[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_7[\mathbf{T}_0^{(u,A_g)}] \otimes \mathbb{F}_8[\mathbf{T}_{1,1}^{(k,T_u)}]}{3} \\ & - \frac{9\sqrt{2}\mathbb{X}_{51}[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_8[\mathbf{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbf{T}_{3,1}^{(k,T_u,1)}]}{91} + \frac{31\sqrt{2}\mathbb{X}_{51}[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_8[\mathbf{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbf{T}_{1,1}^{(k,T_u)}]}{273} + \frac{\sqrt{6}\mathbb{X}_{51}[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_9[\mathbf{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbf{T}_{3,1}^{(k,T_u,1)}]}{7} \\ & + \frac{2\sqrt{6}\mathbb{X}_{51}[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_9[\mathbf{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbf{T}_{1,1}^{(k,T_u)}]}{21} - \frac{\mathbb{X}_{52}[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_7[\mathbf{T}_0^{(u,A_g)}] \otimes \mathbb{F}_9[\mathbf{T}_{1,2}^{(k,T_u)}]}{3} - \frac{15\sqrt{2}\mathbb{X}_{52}[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_8[\mathbf{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbf{T}_{3,2}^{(k,T_u,1)}]}{91} \\ & - \frac{109\sqrt{2}\mathbb{X}_{52}[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_8[\mathbf{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbf{T}_{1,2}^{(k,T_u)}]}{546} - \frac{11\sqrt{6}\mathbb{X}_{52}[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_9[\mathbf{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbf{T}_{3,2}^{(k,T_u,1)}]}{91} + \frac{5\sqrt{6}\mathbb{X}_{52}[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_9[\mathbf{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbf{T}_{1,2}^{(k,T_u)}]}{546} \end{aligned}$$



$$\boxed{\text{No. 17}} \quad \hat{\mathbb{Q}}_4^{(A_g)} [\text{M}_4, \text{B}_1]$$

$$\begin{aligned} \hat{\mathbb{Z}}_{17} = & \frac{\sqrt{3}\mathbb{X}_{50}[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{Y}_{13}[\mathbb{Q}_{3,0}^{(b,T_u,1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{51}[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{Y}_{14}[\mathbb{Q}_{3,1}^{(b,T_u,1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{52}[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{Y}_{15}[\mathbb{Q}_{3,2}^{(b,T_u,1)}]}{3} \\ \hat{\mathbb{Z}}_{17}(\mathbf{k}) = & -\frac{\mathbb{X}_{50}[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{3} - \frac{73\sqrt{2}\mathbb{X}_{50}[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{546} + \frac{24\sqrt{2}\mathbb{X}_{50}[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{91} \\ & - \frac{47\sqrt{6}\mathbb{X}_{50}[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{546} - \frac{2\sqrt{6}\mathbb{X}_{50}[\mathbb{Q}_{1,0}^{(a,T_u)}] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{91} - \frac{\mathbb{X}_{51}[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{3} \\ & + \frac{107\sqrt{2}\mathbb{X}_{51}[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{546} - \frac{9\sqrt{2}\mathbb{X}_{51}[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{91} - \frac{\sqrt{6}\mathbb{X}_{51}[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{42} \\ & + \frac{\sqrt{6}\mathbb{X}_{51}[\mathbb{Q}_{1,1}^{(a,T_u)}] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{7} - \frac{\mathbb{X}_{52}[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{3} - \frac{17\sqrt{2}\mathbb{X}_{52}[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{273} \\ & - \frac{15\sqrt{2}\mathbb{X}_{52}[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{91} + \frac{10\sqrt{6}\mathbb{X}_{52}[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{91} - \frac{11\sqrt{6}\mathbb{X}_{52}[\mathbb{Q}_{1,2}^{(a,T_u)}] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{91} \end{aligned}$$

$$\boxed{\text{No. 18}} \quad \hat{\mathbb{Q}}_0^{(A_g)}(1,0) [\text{M}_4, \text{B}_1]$$

$$\begin{aligned} \hat{\mathbb{Z}}_{18} = & \frac{\sqrt{3}\mathbb{X}_{53}[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{Y}_5[\mathbb{Q}_{1,0}^{(b,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{54}[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{Y}_6[\mathbb{Q}_{1,1}^{(b,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{55}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{Y}_7[\mathbb{Q}_{1,2}^{(b,T_u)}]}{3} \\ \hat{\mathbb{Z}}_{18}(\mathbf{k}) = & -\frac{\mathbb{X}_{53}[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{3} + \frac{24\sqrt{2}\mathbb{X}_{53}[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{91} + \frac{47\sqrt{2}\mathbb{X}_{53}[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{546} \\ & - \frac{2\sqrt{6}\mathbb{X}_{53}[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{91} - \frac{19\sqrt{6}\mathbb{X}_{53}[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{182} \\ & - \frac{\mathbb{X}_{54}[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{3} - \frac{9\sqrt{2}\mathbb{X}_{54}[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{91} + \frac{31\sqrt{2}\mathbb{X}_{54}[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{273} \\ & + \frac{\sqrt{6}\mathbb{X}_{54}[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{7} + \frac{2\sqrt{6}\mathbb{X}_{54}[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{21} - \frac{\mathbb{X}_{55}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{3} \\ & - \frac{15\sqrt{2}\mathbb{X}_{55}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{91} - \frac{109\sqrt{2}\mathbb{X}_{55}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{546} \\ & - \frac{11\sqrt{6}\mathbb{X}_{55}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{91} + \frac{5\sqrt{6}\mathbb{X}_{55}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{546} \end{aligned}$$

$$\boxed{\text{No. 19}} \quad \hat{\mathbb{Q}}_4^{(A_g)}(1,0) [\text{M}_4, \text{B}_1]$$

$$\hat{\mathbb{Z}}_{19} = \frac{\sqrt{3}\mathbb{X}_{53}[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{Y}_{13}[\mathbb{Q}_{3,0}^{(b,T_u,1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{54}[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{Y}_{14}[\mathbb{Q}_{3,1}^{(b,T_u,1)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{55}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{Y}_{15}[\mathbb{Q}_{3,2}^{(b,T_u,1)}]}{3}$$

$$\begin{aligned}
\hat{Z}_{19}(\mathbf{k}) = & -\frac{\mathbb{X}_{53}[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{3} - \frac{73\sqrt{2}\mathbb{X}_{53}[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{546} \\
& + \frac{24\sqrt{2}\mathbb{X}_{53}[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{91} - \frac{47\sqrt{6}\mathbb{X}_{53}[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{546} \\
& - \frac{2\sqrt{6}\mathbb{X}_{53}[\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{91} - \frac{\mathbb{X}_{54}[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{3} \\
& + \frac{107\sqrt{2}\mathbb{X}_{54}[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{546} - \frac{9\sqrt{2}\mathbb{X}_{54}[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{91} \\
& - \frac{\sqrt{6}\mathbb{X}_{54}[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{42} + \frac{\sqrt{6}\mathbb{X}_{54}[\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{7} - \frac{\mathbb{X}_{55}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{3} \\
& - \frac{17\sqrt{2}\mathbb{X}_{55}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{273} - \frac{15\sqrt{2}\mathbb{X}_{55}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{91} \\
& + \frac{10\sqrt{6}\mathbb{X}_{55}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{91} - \frac{11\sqrt{6}\mathbb{X}_{55}[\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{91}
\end{aligned}$$

$$\boxed{\text{No. 20}} \quad \hat{\mathbb{G}}_3^{(A_g)}(1, -1) [\mathbb{M}_4, \mathbb{B}_1]$$

$$\hat{Z}_{20} = \frac{\sqrt{3}\mathbb{X}_{56}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{Y}_{17}[\mathbb{T}_{1,0}^{(b,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{57}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{Y}_{18}[\mathbb{T}_{1,1}^{(b,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{58}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{Y}_{19}[\mathbb{T}_{1,2}^{(b,T_u)}]}{3}$$

$$\begin{aligned}
\hat{Z}_{20}(\mathbf{k}) = & \frac{\mathbb{X}_{56}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{3} - \frac{24\sqrt{2}\mathbb{X}_{56}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{91} \\
& - \frac{47\sqrt{2}\mathbb{X}_{56}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{546} + \frac{2\sqrt{6}\mathbb{X}_{56}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{91} \\
& + \frac{19\sqrt{6}\mathbb{X}_{56}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{182} + \frac{\mathbb{X}_{57}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{3} \\
& + \frac{9\sqrt{2}\mathbb{X}_{57}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{91} \\
& - \frac{31\sqrt{2}\mathbb{X}_{57}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{273} - \frac{\sqrt{6}\mathbb{X}_{57}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{7} \\
& - \frac{2\sqrt{6}\mathbb{X}_{57}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{21} + \frac{\mathbb{X}_{58}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{3} \\
& + \frac{15\sqrt{2}\mathbb{X}_{58}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{91} + \frac{109\sqrt{2}\mathbb{X}_{58}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{546} \\
& + \frac{11\sqrt{6}\mathbb{X}_{58}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{91} - \frac{5\sqrt{6}\mathbb{X}_{58}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{546}
\end{aligned}$$

$$\boxed{\text{No. 21}} \quad \hat{\mathbb{G}}_3^{(A_g)}(1, -1) [\mathbb{M}_4, \mathbb{B}_1]$$

$$\hat{\mathbb{Z}}_{21} = -\frac{\sqrt{3}\mathbb{X}_{56}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{Y}_{25}[\mathbb{T}_{3,0}^{(b,T_u,1)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{57}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{Y}_{26}[\mathbb{T}_{3,1}^{(b,T_u,1)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{58}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{Y}_{27}[\mathbb{T}_{3,2}^{(b,T_u,1)}]}{3}$$

$$\begin{aligned} \hat{\mathbb{Z}}_{21}(\mathbf{k}) = & -\frac{\mathbb{X}_{56}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{3} - \frac{73\sqrt{2}\mathbb{X}_{56}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{546} \\ & + \frac{24\sqrt{2}\mathbb{X}_{56}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{91} - \frac{47\sqrt{6}\mathbb{X}_{56}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{10}[\mathbb{T}_{3,0}^{(k,T_u,1)}]}{546} \\ & - \frac{2\sqrt{6}\mathbb{X}_{56}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_7[\mathbb{T}_{1,0}^{(k,T_u)}]}{91} - \frac{\mathbb{X}_{57}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{3} \\ & + \frac{107\sqrt{2}\mathbb{X}_{57}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{546} - \frac{9\sqrt{2}\mathbb{X}_{57}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{91} \\ & - \frac{\sqrt{6}\mathbb{X}_{57}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{11}[\mathbb{T}_{3,1}^{(k,T_u,1)}]}{42} + \frac{\sqrt{6}\mathbb{X}_{57}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_8[\mathbb{T}_{1,1}^{(k,T_u)}]}{7} \\ & - \frac{\mathbb{X}_{58}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{3} - \frac{17\sqrt{2}\mathbb{X}_{58}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{273} \\ & - \frac{15\sqrt{2}\mathbb{X}_{58}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{91} + \frac{10\sqrt{6}\mathbb{X}_{58}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_{12}[\mathbb{T}_{3,2}^{(k,T_u,1)}]}{91} \\ & - \frac{11\sqrt{6}\mathbb{X}_{58}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_9[\mathbb{T}_{1,2}^{(k,T_u)}]}{91} \end{aligned}$$

$$\boxed{\text{No. 22}} \quad \hat{\mathbb{Q}}_0^{(A_g)} [\mathbb{M}_3, \mathbb{B}_1]$$

$$\hat{\mathbb{Z}}_{22} = \mathbb{X}_{14}[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{Y}_4[\mathbb{Q}_0^{(b,A_g)}]$$

$$\hat{\mathbb{Z}}_{22}(\mathbf{k}) = \frac{\sqrt{3}\mathbb{X}_{14}[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{14}[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{14}[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{3}$$

$$\boxed{\text{No. 23}} \quad \hat{\mathbb{Q}}_0^{(A_g)}(1, 1) [\mathbb{M}_3, \mathbb{B}_1]$$

$$\hat{\mathbb{Z}}_{23} = \mathbb{X}_{15}[\mathbb{Q}_0^{(a,A_g)}(1, 1)] \otimes \mathbb{Y}_4[\mathbb{Q}_0^{(b,A_g)}]$$

$$\hat{\mathbb{Z}}_{23}(\mathbf{k}) = \frac{\sqrt{3}\mathbb{X}_{15}[\mathbb{Q}_0^{(a,A_g)}(1, 1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{15}[\mathbb{Q}_0^{(a,A_g)}(1, 1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{15}[\mathbb{Q}_0^{(a,A_g)}(1, 1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{3}$$

$$\hat{\mathbb{Z}}_{24} = \frac{\boxed{\text{No. 24}} \hat{\mathbb{Q}}_0^{(A_g)} [\mathbf{M}_3, \mathbf{B}_1]}{\sqrt{5}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{Y}_8[\mathbb{Q}_{2,0}^{(b,E_g)}]} + \frac{\sqrt{5}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{Y}_9[\mathbb{Q}_{2,1}^{(b,E_g)}]}{5} + \frac{\sqrt{5}\mathbb{X}_{18}[\mathbb{Q}_{2,0}^{(a,T_g)}] \otimes \mathbb{Y}_{10}[\mathbb{Q}_{2,0}^{(b,T_g)}]}{5} + \frac{\sqrt{5}\mathbb{X}_{19}[\mathbb{Q}_{2,1}^{(a,T_g)}] \otimes \mathbb{Y}_{11}[\mathbb{Q}_{2,1}^{(b,T_g)}]}{5} + \frac{\sqrt{5}\mathbb{X}_{20}[\mathbb{Q}_{2,2}^{(a,T_g)}] \otimes \mathbb{Y}_{12}[\mathbb{Q}_{2,2}^{(b,T_g)}]}{5}$$

$$\hat{\mathbb{Z}}_{24}(\mathbf{k}) = \frac{\sqrt{15}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{15} + \frac{\sqrt{15}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{15} + \frac{143\sqrt{30}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{10290}$$

$$+ \frac{18\sqrt{10}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} + \frac{18\sqrt{10}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{30}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{10290}$$

$$+ \frac{\sqrt{15}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{15} + \frac{18\sqrt{10}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{30}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{10290}$$

$$+ \frac{\sqrt{15}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{15} - \frac{143\sqrt{30}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{18\sqrt{10}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{10290}$$

$$+ \frac{\sqrt{15}\mathbb{X}_{18}[\mathbb{Q}_{2,0}^{(a,T_g)}] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{15} - \frac{\sqrt{30}\mathbb{X}_{18}[\mathbb{Q}_{2,0}^{(a,T_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{105} - \frac{4\sqrt{10}\mathbb{X}_{18}[\mathbb{Q}_{2,0}^{(a,T_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{35}$$

$$+ \frac{\sqrt{15}\mathbb{X}_{19}[\mathbb{Q}_{2,1}^{(a,T_g)}] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{15} + \frac{13\sqrt{30}\mathbb{X}_{19}[\mathbb{Q}_{2,1}^{(a,T_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{210} + \frac{3\sqrt{10}\mathbb{X}_{19}[\mathbb{Q}_{2,1}^{(a,T_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{70}$$

$$+ \frac{\sqrt{15}\mathbb{X}_{20}[\mathbb{Q}_{2,2}^{(a,T_g)}] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{15} - \frac{11\sqrt{30}\mathbb{X}_{20}[\mathbb{Q}_{2,2}^{(a,T_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{210} + \frac{\sqrt{10}\mathbb{X}_{20}[\mathbb{Q}_{2,2}^{(a,T_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{14}$$

$$\begin{aligned} \hat{\mathbb{Z}}_{25} &= \frac{\sqrt{2}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{Y}_9[\mathbb{Q}_{2,1}^{(b,E_g)}]}{2} - \frac{\sqrt{2}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{Y}_8[\mathbb{Q}_{2,0}^{(b,E_g)}]}{2} \\ \hat{\mathbb{Z}}_{25}(\mathbf{k}) &= \frac{\sqrt{6}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{6} + \frac{90\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{3}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} \\ &+ \frac{\sqrt{6}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{6} - \frac{143\sqrt{3}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} - \frac{90\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\ &- \frac{\sqrt{6}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{6} - \frac{\sqrt{6}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{6} - \frac{143\sqrt{3}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} \\ &- \frac{90\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} - \frac{90\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} + \frac{143\sqrt{3}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} \end{aligned}$$

$$\begin{aligned} \text{[No. 26]} \quad & \hat{\mathbb{Q}}_4^{(A_g)} [\text{M}_3, \text{B}_1] \\ \hat{\mathbb{Z}}_{26} = & \frac{\sqrt{30}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{Y}_8[\mathbb{Q}_{2,0}^{(b,E_g)}]}{10} + \frac{\sqrt{30}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{Y}_9[\mathbb{Q}_{2,1}^{(b,E_g)}]}{10} - \frac{\sqrt{30}\mathbb{X}_{18}[\mathbb{Q}_{2,0}^{(a,T_g)}] \otimes \mathbb{Y}_{10}[\mathbb{Q}_{2,0}^{(b,T_g)}]}{15} \\ & - \frac{\sqrt{30}\mathbb{X}_{19}[\mathbb{Q}_{2,1}^{(a,T_g)}] \otimes \mathbb{Y}_{11}[\mathbb{Q}_{2,1}^{(b,T_g)}]}{15} - \frac{\sqrt{30}\mathbb{X}_{20}[\mathbb{Q}_{2,2}^{(a,T_g)}] \otimes \mathbb{Y}_{12}[\mathbb{Q}_{2,2}^{(b,T_g)}]}{15} \end{aligned}$$

$$\begin{aligned}
\hat{\mathbb{Z}}_{26}(\mathbf{k}) = & \frac{\sqrt{10}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{10} + \frac{\sqrt{10}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{10} + \frac{143\sqrt{5}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{3430} \\
& + \frac{18\sqrt{15}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} + \frac{18\sqrt{15}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{5}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{3430} \\
& + \frac{\sqrt{10}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{10} + \frac{18\sqrt{15}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{5}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{3430} \\
& + \frac{\sqrt{10}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{10} - \frac{143\sqrt{5}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{18\sqrt{15}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\
& - \frac{\sqrt{10}\mathbb{X}_{18}[\mathbb{Q}_{2,0}^{(a,T_g)}] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{15} + \frac{2\sqrt{5}\mathbb{X}_{18}[\mathbb{Q}_{2,0}^{(a,T_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{105} + \frac{8\sqrt{15}\mathbb{X}_{18}[\mathbb{Q}_{2,0}^{(a,T_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{105} \\
& - \frac{\sqrt{10}\mathbb{X}_{19}[\mathbb{Q}_{2,1}^{(a,T_g)}] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{15} - \frac{13\sqrt{5}\mathbb{X}_{19}[\mathbb{Q}_{2,1}^{(a,T_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{105} - \frac{\sqrt{15}\mathbb{X}_{19}[\mathbb{Q}_{2,1}^{(a,T_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{105} \\
& - \frac{\sqrt{10}\mathbb{X}_{20}[\mathbb{Q}_{2,2}^{(a,T_g)}] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{15} + \frac{11\sqrt{5}\mathbb{X}_{20}[\mathbb{Q}_{2,2}^{(a,T_g)}] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{105} - \frac{\sqrt{15}\mathbb{X}_{20}[\mathbb{Q}_{2,2}^{(a,T_g)}] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{21}
\end{aligned}$$

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

$$\begin{aligned}
\hat{\mathbb{Z}}_{27} = & \frac{\sqrt{5}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1, -1)] \otimes \mathbb{Y}_8[\mathbb{Q}_{2,0}^{(b,E_g)}]}{5} + \frac{\sqrt{5}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1, -1)] \otimes \mathbb{Y}_9[\mathbb{Q}_{2,1}^{(b,E_g)}]}{5} + \frac{\sqrt{5}\mathbb{X}_{23}[\mathbb{Q}_{2,0}^{(a,T_g)}(1, -1)] \otimes \mathbb{Y}_{10}[\mathbb{Q}_{2,0}^{(b,T_g)}]}{5} \\
& + \frac{\sqrt{5}\mathbb{X}_{24}[\mathbb{Q}_{2,1}^{(a,T_g)}(1, -1)] \otimes \mathbb{Y}_{11}[\mathbb{Q}_{2,1}^{(b,T_g)}]}{5} + \frac{\sqrt{5}\mathbb{X}_{25}[\mathbb{Q}_{2,2}^{(a,T_g)}(1, -1)] \otimes \mathbb{Y}_{12}[\mathbb{Q}_{2,2}^{(b,T_g)}]}{5}
\end{aligned}$$

$$\begin{aligned}
\hat{\mathbb{Z}}_{27}(\mathbf{k}) = & \frac{\sqrt{15}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{15} + \frac{\sqrt{15}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{15} \\
& + \frac{143\sqrt{30}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{10290} + \frac{18\sqrt{10}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\
& + \frac{18\sqrt{10}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{30}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{10290} \\
& + \frac{\sqrt{15}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{15} + \frac{18\sqrt{10}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} \\
& - \frac{143\sqrt{30}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{10290} + \frac{\sqrt{15}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{15} \\
& - \frac{143\sqrt{30}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{10290} - \frac{18\sqrt{10}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\
& + \frac{\sqrt{15}\mathbb{X}_{23}[\mathbb{Q}_{2,0}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{15} - \frac{\sqrt{30}\mathbb{X}_{23}[\mathbb{Q}_{2,0}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{105} \\
& - \frac{4\sqrt{10}\mathbb{X}_{23}[\mathbb{Q}_{2,0}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{35} + \frac{\sqrt{15}\mathbb{X}_{24}[\mathbb{Q}_{2,1}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{15} \\
& + \frac{13\sqrt{30}\mathbb{X}_{24}[\mathbb{Q}_{2,1}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{210} + \frac{3\sqrt{10}\mathbb{X}_{24}[\mathbb{Q}_{2,1}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{70} \\
& + \frac{\sqrt{15}\mathbb{X}_{25}[\mathbb{Q}_{2,2}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{15} - \frac{11\sqrt{30}\mathbb{X}_{25}[\mathbb{Q}_{2,2}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{210} \\
& + \frac{\sqrt{10}\mathbb{X}_{25}[\mathbb{Q}_{2,2}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{14}
\end{aligned}$$

$$\boxed{\text{No. 28}} \quad \hat{\mathbb{G}}_3^{(A_g)}(1,-1) [\text{M}_3, \text{B}_1]$$

$$\hat{\mathbb{Z}}_{28} = \frac{\sqrt{2}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{Y}_9[\mathbb{Q}_{2,1}^{(b,E_g)}]}{2} - \frac{\sqrt{2}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{Y}_8[\mathbb{Q}_{2,0}^{(b,E_g)}]}{2}$$

$$\begin{aligned}
\hat{Z}_{28}(\mathbf{k}) = & \frac{\sqrt{6}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{6} + \frac{90\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} \\
& - \frac{143\sqrt{3}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} + \frac{\sqrt{6}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{343} \\
& - \frac{143\sqrt{3}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} - \frac{90\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\
& - \frac{\sqrt{6}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{6} - \frac{\sqrt{6}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{6} \\
& - \frac{143\sqrt{3}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} - \frac{90\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\
& - \frac{90\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} + \frac{143\sqrt{3}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058}
\end{aligned}$$

$$\boxed{\text{No. 29}} \quad \hat{\mathbb{Q}}_4^{(A_g)}(1,-1) [\text{M}_3, \text{B}_1]$$

$$\begin{aligned}
\hat{Z}_{29} = & \frac{\sqrt{30}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{Y}_8[\mathbb{Q}_{2,0}^{(b,E_g)}]}{10} + \frac{\sqrt{30}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{Y}_9[\mathbb{Q}_{2,1}^{(b,E_g)}]}{10} - \frac{\sqrt{30}\mathbb{X}_{23}[\mathbb{Q}_{2,0}^{(a,T_g)}(1,-1)] \otimes \mathbb{Y}_{10}[\mathbb{Q}_{2,0}^{(b,T_g)}]}{15} \\
& - \frac{\sqrt{30}\mathbb{X}_{24}[\mathbb{Q}_{2,1}^{(a,T_g)}(1,-1)] \otimes \mathbb{Y}_{11}[\mathbb{Q}_{2,1}^{(b,T_g)}]}{15} - \frac{\sqrt{30}\mathbb{X}_{25}[\mathbb{Q}_{2,2}^{(a,T_g)}(1,-1)] \otimes \mathbb{Y}_{12}[\mathbb{Q}_{2,2}^{(b,T_g)}]}{15}
\end{aligned}$$

$$\begin{aligned}
\hat{Z}_{29}(\mathbf{k}) = & \frac{\sqrt{10}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{10} + \frac{\sqrt{10}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{10} \\
& + \frac{143\sqrt{5}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{3430} + \frac{18\sqrt{15}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\
& + \frac{18\sqrt{15}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{5}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{3430} \\
& + \frac{\sqrt{10}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{10} + \frac{18\sqrt{15}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} \\
& - \frac{143\sqrt{5}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{3430} + \frac{\sqrt{10}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{10} \\
& - \frac{143\sqrt{5}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{3430} - \frac{18\sqrt{15}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\
& - \frac{\sqrt{10}\mathbb{X}_{23}[\mathbb{Q}_{2,0}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{15} + \frac{2\sqrt{5}\mathbb{X}_{23}[\mathbb{Q}_{2,0}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{105} \\
& + \frac{8\sqrt{15}\mathbb{X}_{23}[\mathbb{Q}_{2,0}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{105} - \frac{\sqrt{10}\mathbb{X}_{24}[\mathbb{Q}_{2,1}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{15} \\
& - \frac{13\sqrt{5}\mathbb{X}_{24}[\mathbb{Q}_{2,1}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{105} - \frac{\sqrt{15}\mathbb{X}_{24}[\mathbb{Q}_{2,1}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{35} \\
& - \frac{\sqrt{10}\mathbb{X}_{25}[\mathbb{Q}_{2,2}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{15} + \frac{11\sqrt{5}\mathbb{X}_{25}[\mathbb{Q}_{2,2}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{105} \\
& - \frac{\sqrt{15}\mathbb{X}_{25}[\mathbb{Q}_{2,2}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{21}
\end{aligned}$$

$$\boxed{\text{No. 30}} \quad \hat{\mathbb{G}}_3^{(A_g)}(1,0) [\text{M}_3, \text{B}_1]$$

$$\begin{aligned}
\hat{Z}_{30} = & \frac{\sqrt{3}\mathbb{X}_{26}[\mathbb{G}_{1,0}^{(a,T_g)}(1,0)] \otimes \mathbb{Y}_{10}[\mathbb{Q}_{2,0}^{(b,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{27}[\mathbb{G}_{1,1}^{(a,T_g)}(1,0)] \otimes \mathbb{Y}_{11}[\mathbb{Q}_{2,1}^{(b,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{28}[\mathbb{G}_{1,2}^{(a,T_g)}(1,0)] \otimes \mathbb{Y}_{12}[\mathbb{Q}_{2,2}^{(b,T_g)}]}{3} \\
\hat{Z}_{30}(\mathbf{k}) = & \frac{\mathbb{X}_{26}[\mathbb{G}_{1,0}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{3} - \frac{\sqrt{2}\mathbb{X}_{26}[\mathbb{G}_{1,0}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{21} - \frac{4\sqrt{6}\mathbb{X}_{26}[\mathbb{G}_{1,0}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{21} \\
& + \frac{\mathbb{X}_{27}[\mathbb{G}_{1,1}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{3} + \frac{13\sqrt{2}\mathbb{X}_{27}[\mathbb{G}_{1,1}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{42} + \frac{\sqrt{6}\mathbb{X}_{27}[\mathbb{G}_{1,1}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{14} \\
& + \frac{\mathbb{X}_{28}[\mathbb{G}_{1,2}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_4[\mathbb{Q}_0^{(u,A_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{3} - \frac{11\sqrt{2}\mathbb{X}_{28}[\mathbb{G}_{1,2}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_5[\mathbb{Q}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{42} + \frac{5\sqrt{6}\mathbb{X}_{28}[\mathbb{G}_{1,2}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_6[\mathbb{Q}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{42}
\end{aligned}$$



$$\hat{\mathbb{Z}}_{31} = \frac{\sqrt{3}\mathbb{X}_{29}[\mathbb{M}_{1,0}^{(a,T_g)}] \otimes \mathbb{Y}_{22}[\mathbb{T}_{2,0}^{(b,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{30}[\mathbb{M}_{1,1}^{(a,T_g)}] \otimes \mathbb{Y}_{23}[\mathbb{T}_{2,1}^{(b,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{31}[\mathbb{M}_{1,2}^{(a,T_g)}] \otimes \mathbb{Y}_{24}[\mathbb{T}_{2,2}^{(b,T_g)}]}{3}$$

No. 32

 $\hat{\mathbb{G}}_3^{(A_g)}(1, 1) [\mathbf{M}_3, \mathbf{B}_1]$

$$\hat{Z}_{32} = \frac{\sqrt{3}\mathbb{X}_{32}[\mathbb{M}_{1,0}^{(a,T_g)}(1,1)] \otimes \mathbb{Y}_{22}[\mathbb{T}_{2,0}^{(b,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{33}[\mathbb{M}_{1,1}^{(a,T_g)}(1,1)] \otimes \mathbb{Y}_{23}[\mathbb{T}_{2,1}^{(b,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{34}[\mathbb{M}_{1,2}^{(a,T_g)}(1,1)] \otimes \mathbb{Y}_{24}[\mathbb{T}_{2,2}^{(b,T_g)}]}{3}$$

$$\begin{aligned} \hat{\mathbb{Z}}_{32}(\mathbf{k}) = & \frac{\mathbb{X}_{32}[\mathbb{M}_{1,0}^{(a,T_g)}(1,1)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{3} - \frac{\sqrt{2}\mathbb{X}_{32}[\mathbb{M}_{1,0}^{(a,T_g)}(1,1)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{21} - \frac{4\sqrt{6}\mathbb{X}_{32}[\mathbb{M}_{1,0}^{(a,T_g)}(1,1)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{21} \\ & + \frac{\mathbb{X}_{33}[\mathbb{M}_{1,1}^{(a,T_g)}(1,1)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{3} + \frac{13\sqrt{2}\mathbb{X}_{33}[\mathbb{M}_{1,1}^{(a,T_g)}(1,1)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{42} + \frac{\sqrt{6}\mathbb{X}_{33}[\mathbb{M}_{1,1}^{(a,T_g)}(1,1)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{14} \\ & + \frac{\mathbb{X}_{34}[\mathbb{M}_{1,2}^{(a,T_g)}(1,1)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{3} - \frac{11\sqrt{2}\mathbb{X}_{34}[\mathbb{M}_{1,2}^{(a,T_g)}(1,1)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{42} + \frac{5\sqrt{6}\mathbb{X}_{34}[\mathbb{M}_{1,2}^{(a,T_g)}(1,1)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{42} \end{aligned}$$

$$\hat{\mathbb{Z}}_{33} = \frac{\sqrt{3}\mathbb{X}_{35}[\mathbb{M}_{1,0}^{(a,T_g)}(1,-1)] \otimes \mathbb{Y}_{22}[\mathbb{T}_{2,0}^{(b,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{36}[\mathbb{M}_{1,1}^{(a,T_g)}(1,-1)] \otimes \mathbb{Y}_{23}[\mathbb{T}_{2,1}^{(b,T_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{37}[\mathbb{M}_{1,2}^{(a,T_g)}(1,-1)] \otimes \mathbb{Y}_{24}[\mathbb{T}_{2,2}^{(b,T_g)}]}{3}$$

$$\hat{Z}_{33}(\mathbf{k}) = \frac{\mathbb{X}_{35}[\mathbb{M}_{1,0}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{3} - \frac{\sqrt{2}\mathbb{X}_{35}[\mathbb{M}_{1,0}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{21} - \frac{4\sqrt{6}\mathbb{X}_{35}[\mathbb{M}_{1,0}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{21} \\ + \frac{\mathbb{X}_{36}[\mathbb{M}_{1,1}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{3} + \frac{13\sqrt{2}\mathbb{X}_{36}[\mathbb{M}_{1,1}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{42} \\ + \frac{\sqrt{6}\mathbb{X}_{36}[\mathbb{M}_{1,1}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{14} + \frac{\mathbb{X}_{37}[\mathbb{M}_{1,2}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{3} \\ - \frac{11\sqrt{2}\mathbb{X}_{37}[\mathbb{M}_{1,2}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{42} + \frac{5\sqrt{6}\mathbb{X}_{37}[\mathbb{M}_{1,2}^{(a,T_g)}(1,-1)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{42}$$

$$\boxed{\text{No. 34}} \quad \hat{\mathbb{G}}_3^{(A_g)}(1, -1) [\mathbb{M}_3, \mathbb{B}_1]$$

$$\hat{\mathbb{Z}}_{34} = \mathbb{X}_{47}[\mathbb{M}_3^{(a, A_g)}(1, -1)] \otimes \mathbb{Y}_{16}[\mathbb{T}_0^{(b, A_g)}]$$

$$\hat{\mathbb{Z}}_{34}(\mathbf{k})$$

$$= \frac{\sqrt{3}\mathbb{X}_{47}[\mathbb{M}_3^{(a, A_g)}(1, -1)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u, A_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k, A_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{47}[\mathbb{M}_3^{(a, A_g)}(1, -1)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u, E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k, E_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{47}[\mathbb{M}_3^{(a, A_g)}(1, -1)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u, E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k, E_g)}]}{3}$$

$$\boxed{\text{No. 35}} \quad \hat{\mathbb{G}}_3^{(A_g)}(1, -1) [\mathbb{M}_3, \mathbb{B}_1]$$

$$\hat{\mathbb{Z}}_{35} = -\frac{\sqrt{3}\mathbb{X}_{38}[\mathbb{M}_{3,0}^{(a, T_g, 1)}(1, -1)] \otimes \mathbb{Y}_{22}[\mathbb{T}_{2,0}^{(b, T_g)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{39}[\mathbb{M}_{3,1}^{(a, T_g, 1)}(1, -1)] \otimes \mathbb{Y}_{23}[\mathbb{T}_{2,1}^{(b, T_g)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{40}[\mathbb{M}_{3,2}^{(a, T_g, 1)}(1, -1)] \otimes \mathbb{Y}_{24}[\mathbb{T}_{2,2}^{(b, T_g)}]}{3}$$

$$\begin{aligned} \hat{\mathbb{Z}}_{35}(\mathbf{k}) = & -\frac{\mathbb{X}_{38}[\mathbb{M}_{3,0}^{(a, T_g, 1)}(1, -1)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u, A_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k, T_g)}]}{3} + \frac{\sqrt{2}\mathbb{X}_{38}[\mathbb{M}_{3,0}^{(a, T_g, 1)}(1, -1)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u, E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k, T_g)}]}{21} \\ & + \frac{4\sqrt{6}\mathbb{X}_{38}[\mathbb{M}_{3,0}^{(a, T_g, 1)}(1, -1)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u, E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k, T_g)}]}{21} - \frac{\mathbb{X}_{39}[\mathbb{M}_{3,1}^{(a, T_g, 1)}(1, -1)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u, A_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k, T_g)}]}{3} \\ & - \frac{13\sqrt{2}\mathbb{X}_{39}[\mathbb{M}_{3,1}^{(a, T_g, 1)}(1, -1)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u, E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k, T_g)}]}{42} - \frac{\sqrt{6}\mathbb{X}_{39}[\mathbb{M}_{3,1}^{(a, T_g, 1)}(1, -1)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u, E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k, T_g)}]}{14} \\ & - \frac{\mathbb{X}_{40}[\mathbb{M}_{3,2}^{(a, T_g, 1)}(1, -1)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u, A_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k, T_g)}]}{3} + \frac{11\sqrt{2}\mathbb{X}_{40}[\mathbb{M}_{3,2}^{(a, T_g, 1)}(1, -1)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u, E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k, T_g)}]}{42} \\ & - \frac{5\sqrt{6}\mathbb{X}_{40}[\mathbb{M}_{3,2}^{(a, T_g, 1)}(1, -1)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u, E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k, T_g)}]}{42} \end{aligned}$$

$$\boxed{\text{No. 36}} \quad \hat{\mathbb{Q}}_4^{(A_g)}(1, -1) [\mathbb{M}_3, \mathbb{B}_1]$$

$$\hat{\mathbb{Z}}_{36} = -\frac{\sqrt{3}\mathbb{X}_{41}[\mathbb{M}_{3,0}^{(a, T_g, 2)}(1, -1)] \otimes \mathbb{Y}_{22}[\mathbb{T}_{2,0}^{(b, T_g)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{42}[\mathbb{M}_{3,1}^{(a, T_g, 2)}(1, -1)] \otimes \mathbb{Y}_{23}[\mathbb{T}_{2,1}^{(b, T_g)}]}{3} - \frac{\sqrt{3}\mathbb{X}_{43}[\mathbb{M}_{3,2}^{(a, T_g, 2)}(1, -1)] \otimes \mathbb{Y}_{24}[\mathbb{T}_{2,2}^{(b, T_g)}]}{3}$$

$$\begin{aligned} \hat{\mathbb{Z}}_{36}(\mathbf{k}) = & -\frac{\mathbb{X}_{41}[\mathbb{M}_{3,0}^{(a, T_g, 2)}(1, -1)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u, A_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k, T_g)}]}{3} + \frac{\sqrt{2}\mathbb{X}_{41}[\mathbb{M}_{3,0}^{(a, T_g, 2)}(1, -1)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u, E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k, T_g)}]}{21} \\ & + \frac{4\sqrt{6}\mathbb{X}_{41}[\mathbb{M}_{3,0}^{(a, T_g, 2)}(1, -1)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u, E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k, T_g)}]}{21} - \frac{\mathbb{X}_{42}[\mathbb{M}_{3,1}^{(a, T_g, 2)}(1, -1)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u, A_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k, T_g)}]}{3} \\ & - \frac{13\sqrt{2}\mathbb{X}_{42}[\mathbb{M}_{3,1}^{(a, T_g, 2)}(1, -1)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u, E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k, T_g)}]}{42} - \frac{\sqrt{6}\mathbb{X}_{42}[\mathbb{M}_{3,1}^{(a, T_g, 2)}(1, -1)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u, E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k, T_g)}]}{14} \\ & - \frac{\mathbb{X}_{43}[\mathbb{M}_{3,2}^{(a, T_g, 2)}(1, -1)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u, A_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k, T_g)}]}{3} + \frac{11\sqrt{2}\mathbb{X}_{43}[\mathbb{M}_{3,2}^{(a, T_g, 2)}(1, -1)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u, E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k, T_g)}]}{42} \\ & - \frac{5\sqrt{6}\mathbb{X}_{43}[\mathbb{M}_{3,2}^{(a, T_g, 2)}(1, -1)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u, E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k, T_g)}]}{42} \end{aligned}$$

$$\boxed{\text{No. 37}} \quad \hat{\mathbb{Q}}_0^{(A_g)}(1, 0) [M_3, B_1]$$

$$\hat{Z}_{37} = \frac{\sqrt{5}\mathbb{X}_{44}[\mathbb{T}_{2,0}^{(a,T_g)}(1, 0)] \otimes \mathbb{Y}_{22}[\mathbb{T}_{2,0}^{(b,T_g)}]}{5} + \frac{\sqrt{5}\mathbb{X}_{45}[\mathbb{T}_{2,1}^{(a,T_g)}(1, 0)] \otimes \mathbb{Y}_{23}[\mathbb{T}_{2,1}^{(b,T_g)}]}{5} + \frac{\sqrt{5}\mathbb{X}_{46}[\mathbb{T}_{2,2}^{(a,T_g)}(1, 0)] \otimes \mathbb{Y}_{24}[\mathbb{T}_{2,2}^{(b,T_g)}]}{5} \\ + \frac{\sqrt{5}\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1, 0)] \otimes \mathbb{Y}_{20}[\mathbb{T}_{2,0}^{(b,E_g)}]}{5} + \frac{\sqrt{5}\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1, 0)] \otimes \mathbb{Y}_{21}[\mathbb{T}_{2,1}^{(b,E_g)}]}{5}$$

$$\hat{Z}_{37}(\mathbf{k}) = \frac{\sqrt{15}\mathbb{X}_{44}[\mathbb{T}_{2,0}^{(a,T_g)}(1, 0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{15} - \frac{\sqrt{30}\mathbb{X}_{44}[\mathbb{T}_{2,0}^{(a,T_g)}(1, 0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{105} - \frac{4\sqrt{10}\mathbb{X}_{44}[\mathbb{T}_{2,0}^{(a,T_g)}(1, 0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{35} \\ + \frac{\sqrt{15}\mathbb{X}_{45}[\mathbb{T}_{2,1}^{(a,T_g)}(1, 0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{15} + \frac{13\sqrt{30}\mathbb{X}_{45}[\mathbb{T}_{2,1}^{(a,T_g)}(1, 0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{210} \\ + \frac{3\sqrt{10}\mathbb{X}_{45}[\mathbb{T}_{2,1}^{(a,T_g)}(1, 0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{70} + \frac{\sqrt{15}\mathbb{X}_{46}[\mathbb{T}_{2,2}^{(a,T_g)}(1, 0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{15} \\ - \frac{11\sqrt{30}\mathbb{X}_{46}[\mathbb{T}_{2,2}^{(a,T_g)}(1, 0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{210} + \frac{\sqrt{10}\mathbb{X}_{46}[\mathbb{T}_{2,2}^{(a,T_g)}(1, 0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{14} \\ + \frac{\sqrt{15}\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1, 0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{15} + \frac{\sqrt{15}\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1, 0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{15} \\ + \frac{143\sqrt{30}\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1, 0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{10290} + \frac{18\sqrt{10}\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1, 0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\ + \frac{18\sqrt{10}\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1, 0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{30}\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1, 0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{10290} \\ + \frac{\sqrt{15}\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1, 0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{15} + \frac{18\sqrt{10}\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1, 0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} \\ - \frac{143\sqrt{30}\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1, 0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{10290} + \frac{\sqrt{15}\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1, 0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{15} \\ - \frac{143\sqrt{30}\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1, 0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{10290} - \frac{18\sqrt{10}\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1, 0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343}$$

$$\boxed{\text{No. 38}} \quad \hat{\mathbb{G}}_3^{(A_g)}(1, 0) [M_3, B_1]$$

$$\hat{Z}_{38} = \frac{\sqrt{2}\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1, 0)] \otimes \mathbb{Y}_{21}[\mathbb{T}_{2,1}^{(b,E_g)}]}{2} - \frac{\sqrt{2}\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1, 0)] \otimes \mathbb{Y}_{20}[\mathbb{T}_{2,0}^{(b,E_g)}]}{2}$$

$$\begin{aligned}\hat{Z}_{38}(\mathbf{k}) = & \frac{\sqrt{6}\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{6} + \frac{90\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{3}\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} \\ & + \frac{\sqrt{6}\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{6} - \frac{143\sqrt{3}\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} - \frac{90\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\ & - \frac{\sqrt{6}\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{6} - \frac{\sqrt{6}\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{6} - \frac{143\sqrt{3}\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} \\ & - \frac{90\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} - \frac{90\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} + \frac{143\sqrt{3}\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058}\end{aligned}$$

$$\boxed{\text{No. 39}} \quad \hat{\mathbb{Q}}_4^{(A_g)}(1,0) \text{ [M}_3, \text{B}_1]$$

$$\begin{aligned}\hat{Z}_{39} = & -\frac{\sqrt{30}\mathbb{X}_{44}[\mathbb{T}_{2,0}^{(a,T_g)}(1,0)] \otimes \mathbb{Y}_{22}[\mathbb{T}_{2,0}^{(b,T_g)}]}{15} - \frac{\sqrt{30}\mathbb{X}_{45}[\mathbb{T}_{2,1}^{(a,T_g)}(1,0)] \otimes \mathbb{Y}_{23}[\mathbb{T}_{2,1}^{(b,T_g)}]}{15} - \frac{\sqrt{30}\mathbb{X}_{46}[\mathbb{T}_{2,2}^{(a,T_g)}(1,0)] \otimes \mathbb{Y}_{24}[\mathbb{T}_{2,2}^{(b,T_g)}]}{15} \\ & + \frac{\sqrt{30}\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1,0)] \otimes \mathbb{Y}_{20}[\mathbb{T}_{2,0}^{(b,E_g)}]}{10} + \frac{\sqrt{30}\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1,0)] \otimes \mathbb{Y}_{21}[\mathbb{T}_{2,1}^{(b,E_g)}]}{10}\end{aligned}$$

$$\begin{aligned}\hat{Z}_{39}(\mathbf{k}) = & -\frac{\sqrt{10}\mathbb{X}_{44}[\mathbb{T}_{2,0}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{15} + \frac{2\sqrt{5}\mathbb{X}_{44}[\mathbb{T}_{2,0}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{105} + \frac{8\sqrt{15}\mathbb{X}_{44}[\mathbb{T}_{2,0}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_4[\mathbb{Q}_{2,0}^{(k,T_g)}]}{105} \\ & - \frac{\sqrt{10}\mathbb{X}_{45}[\mathbb{T}_{2,1}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{15} - \frac{13\sqrt{5}\mathbb{X}_{45}[\mathbb{T}_{2,1}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{105} - \frac{\sqrt{15}\mathbb{X}_{45}[\mathbb{T}_{2,1}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_5[\mathbb{Q}_{2,1}^{(k,T_g)}]}{35} \\ & - \frac{\sqrt{10}\mathbb{X}_{46}[\mathbb{T}_{2,2}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{15} + \frac{11\sqrt{5}\mathbb{X}_{46}[\mathbb{T}_{2,2}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{105} - \frac{\sqrt{15}\mathbb{X}_{46}[\mathbb{T}_{2,2}^{(a,T_g)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_6[\mathbb{Q}_{2,2}^{(k,T_g)}]}{21} \\ & + \frac{\sqrt{10}\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{10} + \frac{\sqrt{10}\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{10} \\ & + \frac{143\sqrt{5}\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{3430} + \frac{18\sqrt{15}\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\ & + \frac{18\sqrt{15}\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{5}\mathbb{X}_{48}[\mathbb{T}_{2,0}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{3430} \\ & + \frac{\sqrt{10}\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_7[\mathbb{T}_0^{(u,A_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{10} + \frac{18\sqrt{15}\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} \\ & - \frac{143\sqrt{5}\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_8[\mathbb{T}_{2,0}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{3430} + \frac{\sqrt{10}\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_1[\mathbb{Q}_0^{(k,A_g)}]}{10} \\ & - \frac{143\sqrt{5}\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_2[\mathbb{Q}_{2,0}^{(k,E_g)}]}{3430} - \frac{18\sqrt{15}\mathbb{X}_{49}[\mathbb{T}_{2,1}^{(a,E_g)}(1,0)] \otimes \mathbb{U}_9[\mathbb{T}_{2,1}^{(u,E_g)}] \otimes \mathbb{F}_3[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343}\end{aligned}$$

$$\boxed{\text{No. 40}} \quad \hat{\mathbb{Q}}_0^{(A_g)} [\mathbf{M}_1, \mathbf{B}_2]$$

$$\hat{\mathbb{Z}}_{40} = \mathbb{X}_1[\mathbb{Q}_0^{(a, A_g)}] \otimes \mathbb{Y}_{28}[\mathbb{Q}_0^{(b, A_g)}]$$

$$\hat{\mathbb{Z}}_{40}(\mathbf{k}) = \frac{\sqrt{3}\mathbb{X}_1[\mathbb{Q}_0^{(a, A_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s, A_g)}] \otimes \mathbb{F}_{13}[\mathbb{Q}_0^{(k, A_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_1[\mathbb{Q}_0^{(a, A_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s, E_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k, E_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_1[\mathbb{Q}_0^{(a, A_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s, E_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k, E_g)}]}{3}$$

$$\boxed{\text{No. 41}} \quad \hat{\mathbb{G}}_3^{(A_g)}(1, -1) [\mathbf{M}_2, \mathbf{B}_2]$$

$$\hat{\mathbb{Z}}_{41} = \frac{\sqrt{3}\mathbb{X}_{11}[\mathbb{M}_{2,0}^{(a, Tu)}(1, -1)] \otimes \mathbb{Y}_{31}[\mathbb{T}_{1,0}^{(b, Tu)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{12}[\mathbb{M}_{2,1}^{(a, Tu)}(1, -1)] \otimes \mathbb{Y}_{32}[\mathbb{T}_{1,1}^{(b, Tu)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{13}[\mathbb{M}_{2,2}^{(a, Tu)}(1, -1)] \otimes \mathbb{Y}_{33}[\mathbb{T}_{1,2}^{(b, Tu)}]}{3}$$

$$\begin{aligned} \hat{\mathbb{Z}}_{41}(\mathbf{k}) = & \frac{\mathbb{X}_{11}[\mathbb{M}_{2,0}^{(a, Tu)}(1, -1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s, A_g)}] \otimes \mathbb{F}_{16}[\mathbb{T}_{1,0}^{(k, Tu)}]}{3} - \frac{11\sqrt{2}\mathbb{X}_{11}[\mathbb{M}_{2,0}^{(a, Tu)}(1, -1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s, E_g)}] \otimes \mathbb{F}_{16}[\mathbb{T}_{1,0}^{(k, Tu)}]}{42} \\ & + \frac{5\sqrt{6}\mathbb{X}_{11}[\mathbb{M}_{2,0}^{(a, Tu)}(1, -1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s, E_g)}] \otimes \mathbb{F}_{16}[\mathbb{T}_{1,0}^{(k, Tu)}]}{42} + \frac{\mathbb{X}_{12}[\mathbb{M}_{2,1}^{(a, Tu)}(1, -1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s, A_g)}] \otimes \mathbb{F}_{17}[\mathbb{T}_{1,1}^{(k, Tu)}]}{3} \\ & - \frac{\sqrt{2}\mathbb{X}_{12}[\mathbb{M}_{2,1}^{(a, Tu)}(1, -1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s, E_g)}] \otimes \mathbb{F}_{17}[\mathbb{T}_{1,1}^{(k, Tu)}]}{21} - \frac{4\sqrt{6}\mathbb{X}_{12}[\mathbb{M}_{2,1}^{(a, Tu)}(1, -1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s, E_g)}] \otimes \mathbb{F}_{17}[\mathbb{T}_{1,1}^{(k, Tu)}]}{42} \\ & + \frac{\mathbb{X}_{13}[\mathbb{M}_{2,2}^{(a, Tu)}(1, -1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s, A_g)}] \otimes \mathbb{F}_{18}[\mathbb{T}_{1,2}^{(k, Tu)}]}{3} + \frac{13\sqrt{2}\mathbb{X}_{13}[\mathbb{M}_{2,2}^{(a, Tu)}(1, -1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s, E_g)}] \otimes \mathbb{F}_{18}[\mathbb{T}_{1,2}^{(k, Tu)}]}{42} \\ & + \frac{\sqrt{6}\mathbb{X}_{13}[\mathbb{M}_{2,2}^{(a, Tu)}(1, -1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s, E_g)}] \otimes \mathbb{F}_{18}[\mathbb{T}_{1,2}^{(k, Tu)}]}{14} \end{aligned}$$

$$\boxed{\text{No. 42}} \quad \hat{\mathbb{Q}}_0^{(A_g)} [\mathbf{M}_3, \mathbf{B}_2]$$

$$\hat{\mathbb{Z}}_{42} = \mathbb{X}_{14}[\mathbb{Q}_0^{(a, A_g)}] \otimes \mathbb{Y}_{28}[\mathbb{Q}_0^{(b, A_g)}]$$

$$\hat{\mathbb{Z}}_{42}(\mathbf{k}) = \frac{\sqrt{3}\mathbb{X}_{14}[\mathbb{Q}_0^{(a, A_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s, A_g)}] \otimes \mathbb{F}_{13}[\mathbb{Q}_0^{(k, A_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{14}[\mathbb{Q}_0^{(a, A_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s, E_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k, E_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{14}[\mathbb{Q}_0^{(a, A_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s, E_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k, E_g)}]}{3}$$

$$\boxed{\text{No. 43}} \quad \hat{\mathbb{Q}}_0^{(A_g)}(1, 1) [\mathbf{M}_3, \mathbf{B}_2]$$

$$\hat{\mathbb{Z}}_{43} = \mathbb{X}_{15}[\mathbb{Q}_0^{(a, A_g)}(1, 1)] \otimes \mathbb{Y}_{28}[\mathbb{Q}_0^{(b, A_g)}]$$

$$\hat{\mathbb{Z}}_{43}(\mathbf{k}) = \frac{\sqrt{3}\mathbb{X}_{15}[\mathbb{Q}_0^{(a, A_g)}(1, 1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s, A_g)}] \otimes \mathbb{F}_{13}[\mathbb{Q}_0^{(k, A_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{15}[\mathbb{Q}_0^{(a, A_g)}(1, 1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s, E_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k, E_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{15}[\mathbb{Q}_0^{(a, A_g)}(1, 1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s, E_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k, E_g)}]}{3}$$

$$\boxed{\text{No. 44}} \quad \hat{\mathbb{Q}}_0^{(A_g)} [\text{M}_3, \text{B}_2]$$

$$\hat{\mathbb{Z}}_{44} = \frac{\sqrt{2}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{Y}_{29}[\mathbb{Q}_{2,0}^{(b,E_g)}]}{2} + \frac{\sqrt{2}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{Y}_{30}[\mathbb{Q}_{2,1}^{(b,E_g)}]}{2}$$

$$\begin{aligned} \hat{\mathbb{Z}}_{44}(\mathbf{k}) = & \frac{\sqrt{6}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{6} + \frac{\sqrt{6}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{13}[\mathbb{Q}_0^{(k,A_g)}]}{6} + \frac{143\sqrt{3}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} \\ & + \frac{90\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} + \frac{90\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{3}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} \\ & + \frac{\sqrt{6}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{6} + \frac{90\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{3}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} \\ & + \frac{\sqrt{6}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{13}[\mathbb{Q}_0^{(k,A_g)}]}{6} - \frac{143\sqrt{3}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} - \frac{90\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \end{aligned}$$

$$\boxed{\text{No. 45}} \quad \hat{\mathbb{G}}_3^{(A_g)} [\text{M}_3, \text{B}_2]$$

$$\hat{\mathbb{Z}}_{45} = \frac{\sqrt{2}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{Y}_{30}[\mathbb{Q}_{2,1}^{(b,E_g)}]}{2} - \frac{\sqrt{2}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{Y}_{29}[\mathbb{Q}_{2,0}^{(b,E_g)}]}{2}$$

$$\begin{aligned} \hat{\mathbb{Z}}_{45}(\mathbf{k}) = & \frac{\sqrt{6}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{6} + \frac{90\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{3}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} \\ & + \frac{\sqrt{6}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{13}[\mathbb{Q}_0^{(k,A_g)}]}{6} - \frac{143\sqrt{3}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} - \frac{90\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\ & - \frac{\sqrt{6}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{6} - \frac{\sqrt{6}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{13}[\mathbb{Q}_0^{(k,A_g)}]}{6} - \frac{143\sqrt{3}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} \\ & - \frac{90\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} - \frac{90\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} + \frac{143\sqrt{3}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} \end{aligned}$$

$$\boxed{\text{No. 46}} \quad \hat{\mathbb{Q}}_0^{(A_g)}(1, -1) [\text{M}_3, \text{B}_2]$$

$$\hat{\mathbb{Z}}_{46} = \frac{\sqrt{2}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1, -1)] \otimes \mathbb{Y}_{29}[\mathbb{Q}_{2,0}^{(b,E_g)}]}{2} + \frac{\sqrt{2}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1, -1)] \otimes \mathbb{Y}_{30}[\mathbb{Q}_{2,1}^{(b,E_g)}]}{2}$$

$$\begin{aligned}
\hat{\mathbb{Z}}_{46}(\mathbf{k}) = & \frac{\sqrt{6}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{6} + \frac{\sqrt{6}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{13}[\mathbb{Q}_0^{(k,A_g)}]}{6} \\
& + \frac{143\sqrt{3}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} + \frac{90\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\
& + \frac{90\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{3}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} \\
& + \frac{\sqrt{6}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{6} + \frac{90\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} \\
& - \frac{143\sqrt{3}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} + \frac{\sqrt{6}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{13}[\mathbb{Q}_0^{(k,A_g)}]}{6} \\
& - \frac{143\sqrt{3}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} - \frac{90\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343}
\end{aligned}$$

$$\boxed{\text{No. 47}} \quad \hat{\mathbb{G}}_3^{(A_g)}(1,-1) [\text{M}_3, \text{B}_2]$$

$$\hat{\mathbb{Z}}_{47} = \frac{\sqrt{2}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{Y}_{30}[\mathbb{Q}_{2,1}^{(b,E_g)}]}{2} - \frac{\sqrt{2}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{Y}_{29}[\mathbb{Q}_{2,0}^{(b,E_g)}]}{2}$$

$$\begin{aligned}
\hat{\mathbb{Z}}_{47}(\mathbf{k}) = & \frac{\sqrt{6}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{6} + \frac{90\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} \\
& - \frac{143\sqrt{3}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} + \frac{\sqrt{6}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{13}[\mathbb{Q}_0^{(k,A_g)}]}{6} \\
& - \frac{143\sqrt{3}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} - \frac{90\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\
& - \frac{\sqrt{6}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{6} - \frac{\sqrt{6}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{13}[\mathbb{Q}_0^{(k,A_g)}]}{6} \\
& - \frac{143\sqrt{3}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} - \frac{90\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\
& - \frac{90\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{14}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} + \frac{143\sqrt{3}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{15}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058}
\end{aligned}$$

$$\boxed{\text{No. 48}} \quad \hat{\mathbb{Q}}_0^{(A_g)} [\text{M}_1, \text{B}_3]$$

$$\hat{\mathbb{Z}}_{48} = \mathbb{X}_1[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{Y}_{34}[\mathbb{Q}_0^{(b,A_g)}]$$

$$\hat{\mathbb{Z}}_{48}(\mathbf{k}) = \frac{\sqrt{3}\mathbb{X}_1[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{19}[\mathbb{Q}_0^{(k,A_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_1[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_1[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{3}$$

$$\boxed{\text{No. 49}} \quad \hat{\mathbb{G}}_3^{(A_g)}(1, -1) [\mathbb{M}_2, \mathbb{B}_3]$$

$$\hat{\mathbb{Z}}_{49} = \frac{\sqrt{3}\mathbb{X}_{11}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{Y}_{37}[\mathbb{T}_{1,0}^{(b,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{12}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{Y}_{38}[\mathbb{T}_{1,1}^{(b,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{13}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{Y}_{39}[\mathbb{T}_{1,2}^{(b,T_u)}]}{3}$$

$$\begin{aligned} \hat{\mathbb{Z}}_{49}(\mathbf{k}) = & \frac{\mathbb{X}_{11}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{22}[\mathbb{T}_{1,0}^{(k,T_u)}]}{3} + \frac{13\sqrt{2}\mathbb{X}_{11}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{22}[\mathbb{T}_{1,0}^{(k,T_u)}]}{42} \\ & + \frac{\sqrt{6}\mathbb{X}_{11}[\mathbb{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{22}[\mathbb{T}_{1,0}^{(k,T_u)}]}{14} + \frac{\mathbb{X}_{12}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{23}[\mathbb{T}_{1,1}^{(k,T_u)}]}{3} \\ & - \frac{11\sqrt{2}\mathbb{X}_{12}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{23}[\mathbb{T}_{1,1}^{(k,T_u)}]}{42} + \frac{5\sqrt{6}\mathbb{X}_{12}[\mathbb{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{23}[\mathbb{T}_{1,1}^{(k,T_u)}]}{42} \\ & + \frac{\mathbb{X}_{13}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{24}[\mathbb{T}_{1,2}^{(k,T_u)}]}{3} - \frac{\sqrt{2}\mathbb{X}_{13}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{24}[\mathbb{T}_{1,2}^{(k,T_u)}]}{21} \\ & - \frac{4\sqrt{6}\mathbb{X}_{13}[\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{24}[\mathbb{T}_{1,2}^{(k,T_u)}]}{21} \end{aligned}$$

$$\boxed{\text{No. 50}} \quad \hat{\mathbb{Q}}_0^{(A_g)} [\mathbb{M}_3, \mathbb{B}_3]$$

$$\hat{\mathbb{Z}}_{50} = \mathbb{X}_{14}[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{Y}_{34}[\mathbb{Q}_0^{(b,A_g)}]$$

$$\hat{\mathbb{Z}}_{50}(\mathbf{k}) = \frac{\sqrt{3}\mathbb{X}_{14}[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{19}[\mathbb{Q}_0^{(k,A_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{14}[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{14}[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{3}$$

$$\boxed{\text{No. 51}} \quad \hat{\mathbb{Q}}_0^{(A_g)}(1, 1) [\mathbb{M}_3, \mathbb{B}_3]$$

$$\hat{\mathbb{Z}}_{51} = \mathbb{X}_{15}[\mathbb{Q}_0^{(a,A_g)}(1, 1)] \otimes \mathbb{Y}_{34}[\mathbb{Q}_0^{(b,A_g)}]$$

$$\hat{\mathbb{Z}}_{51}(\mathbf{k}) = \frac{\sqrt{3}\mathbb{X}_{15}[\mathbb{Q}_0^{(a,A_g)}(1, 1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{19}[\mathbb{Q}_0^{(k,A_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{15}[\mathbb{Q}_0^{(a,A_g)}(1, 1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{15}[\mathbb{Q}_0^{(a,A_g)}(1, 1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{3}$$

$$\boxed{\text{No. 52}} \quad \hat{\mathbb{Q}}_0^{(A_g)} [\mathbb{M}_3, \mathbb{B}_3]$$

$$\hat{\mathbb{Z}}_{52} = \frac{\sqrt{2}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{Y}_{35}[\mathbb{Q}_{2,0}^{(b,E_g)}]}{2} + \frac{\sqrt{2}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{Y}_{36}[\mathbb{Q}_{2,1}^{(b,E_g)}]}{2}$$



$$\begin{aligned}
\hat{Z}_{52}(\mathbf{k}) = & \frac{\sqrt{6}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{6} + \frac{\sqrt{6}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{19}[\mathbb{Q}_0^{(k,A_g)}]}{6} + \frac{143\sqrt{3}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} \\
& + \frac{90\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} + \frac{90\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{3}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} \\
& + \frac{\sqrt{6}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{6} + \frac{90\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{3}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} \\
& + \frac{\sqrt{6}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{19}[\mathbb{Q}_0^{(k,A_g)}]}{6} - \frac{143\sqrt{3}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} - \frac{90\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343}
\end{aligned}$$

$$\boxed{\text{No. 53}} \quad \hat{\mathbb{G}}_3^{(A_g)} [\text{M}_3, \text{B}_3]$$

$$\hat{Z}_{53} = \frac{\sqrt{2}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{Y}_{36}[\mathbb{Q}_{2,1}^{(b,E_g)}]}{2} - \frac{\sqrt{2}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{Y}_{35}[\mathbb{Q}_{2,0}^{(b,E_g)}]}{2}$$

$$\begin{aligned}
\hat{Z}_{53}(\mathbf{k}) = & \frac{\sqrt{6}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{6} + \frac{90\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{3}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} \\
& + \frac{\sqrt{6}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{19}[\mathbb{Q}_0^{(k,A_g)}]}{6} - \frac{143\sqrt{3}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} - \frac{90\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\
& - \frac{\sqrt{6}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{6} - \frac{\sqrt{6}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{19}[\mathbb{Q}_0^{(k,A_g)}]}{6} - \frac{143\sqrt{3}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} \\
& - \frac{90\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} - \frac{90\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} + \frac{143\sqrt{3}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058}
\end{aligned}$$

$$\boxed{\text{No. 54}} \quad \hat{\mathbb{Q}}_0^{(A_g)}(1, -1) [\text{M}_3, \text{B}_3]$$

$$\hat{Z}_{54} = \frac{\sqrt{2}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1, -1)] \otimes \mathbb{Y}_{35}[\mathbb{Q}_{2,0}^{(b,E_g)}]}{2} + \frac{\sqrt{2}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1, -1)] \otimes \mathbb{Y}_{36}[\mathbb{Q}_{2,1}^{(b,E_g)}]}{2}$$

$$\begin{aligned}
\hat{Z}_{54}(\mathbf{k}) = & \frac{\sqrt{6}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{6} + \frac{\sqrt{6}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{19}[\mathbb{Q}_0^{(k,A_g)}]}{6} \\
& + \frac{143\sqrt{3}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} + \frac{90\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\
& + \frac{90\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{3}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} \\
& + \frac{\sqrt{6}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{6} + \frac{90\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} \\
& - \frac{143\sqrt{3}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} + \frac{\sqrt{6}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{19}[\mathbb{Q}_0^{(k,A_g)}]}{6} \\
& - \frac{143\sqrt{3}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} - \frac{90\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343}
\end{aligned}$$

$$\boxed{\text{No. 55}} \quad \hat{\mathbb{G}}_3^{(A_g)}(1,-1) [\text{M}_3, \text{B}_3]$$

$$\hat{Z}_{55} = \frac{\sqrt{2}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{Y}_{36}[\mathbb{Q}_{2,1}^{(b,E_g)}]}{2} - \frac{\sqrt{2}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{Y}_{35}[\mathbb{Q}_{2,0}^{(b,E_g)}]}{2}$$

$$\begin{aligned}
\hat{Z}_{55}(\mathbf{k}) = & \frac{\sqrt{6}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{6} + \frac{90\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} \\
& - \frac{143\sqrt{3}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} + \frac{\sqrt{6}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{19}[\mathbb{Q}_0^{(k,A_g)}]}{6} \\
& - \frac{143\sqrt{3}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} - \frac{90\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\
& - \frac{\sqrt{6}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{6} - \frac{\sqrt{6}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{19}[\mathbb{Q}_0^{(k,A_g)}]}{6} \\
& - \frac{143\sqrt{3}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} - \frac{90\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\
& - \frac{90\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{20}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} + \frac{143\sqrt{3}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{21}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058}
\end{aligned}$$

$$\boxed{\text{No. 56}} \quad \hat{\mathbb{Q}}_0^{(A_g)} [\text{M}_1, \text{B}_4]$$

$$\hat{Z}_{56} = \mathbb{X}_1[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{Y}_{40}[\mathbb{Q}_0^{(b,A_g)}]$$

$$\hat{Z}_{56}(\mathbf{k}) = \frac{\sqrt{3}\mathbb{X}_1[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{25}[\mathbb{Q}_0^{(k,A_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_1[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_1[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{3}$$

$$\boxed{\text{No. 57}} \quad \hat{\mathbb{G}}_3^{(A_g)}(1, -1) [\text{M}_2, \text{B}_4]$$

$$\hat{\mathbb{Z}}_{57} = \frac{\sqrt{3}\mathbb{X}_{11}[\text{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{Y}_{43}[\mathbb{T}_{1,0}^{(b,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{12}[\text{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{Y}_{44}[\mathbb{T}_{1,1}^{(b,T_u)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{13}[\text{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{Y}_{45}[\mathbb{T}_{1,2}^{(b,T_u)}]}{3}$$

$$\begin{aligned} \hat{\mathbb{Z}}_{57}(\mathbf{k}) = & \frac{\mathbb{X}_{11}[\text{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{28}[\mathbb{T}_{1,0}^{(k,T_u)}]}{3} - \frac{\sqrt{2}\mathbb{X}_{11}[\text{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{28}[\mathbb{T}_{1,0}^{(k,T_u)}]}{21} \\ & - \frac{4\sqrt{6}\mathbb{X}_{11}[\text{M}_{2,0}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{28}[\mathbb{T}_{1,0}^{(k,T_u)}]}{21} + \frac{\mathbb{X}_{12}[\text{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{29}[\mathbb{T}_{1,1}^{(k,T_u)}]}{3} \\ & + \frac{13\sqrt{2}\mathbb{X}_{12}[\text{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{29}[\mathbb{T}_{1,1}^{(k,T_u)}]}{42} + \frac{\sqrt{6}\mathbb{X}_{12}[\text{M}_{2,1}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{29}[\mathbb{T}_{1,1}^{(k,T_u)}]}{14} \\ & + \frac{\mathbb{X}_{13}[\text{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{30}[\mathbb{T}_{1,2}^{(k,T_u)}]}{3} - \frac{11\sqrt{2}\mathbb{X}_{13}[\text{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{30}[\mathbb{T}_{1,2}^{(k,T_u)}]}{42} \\ & + \frac{5\sqrt{6}\mathbb{X}_{13}[\text{M}_{2,2}^{(a,T_u)}(1, -1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{30}[\mathbb{T}_{1,2}^{(k,T_u)}]}{42} \end{aligned}$$

$$\boxed{\text{No. 58}} \quad \hat{\mathbb{Q}}_0^{(A_g)} [\text{M}_3, \text{B}_4]$$

$$\hat{\mathbb{Z}}_{58} = \mathbb{X}_{14}[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{Y}_{40}[\mathbb{Q}_0^{(b,A_g)}]$$

$$\hat{\mathbb{Z}}_{58}(\mathbf{k}) = \frac{\sqrt{3}\mathbb{X}_{14}[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{25}[\mathbb{Q}_0^{(k,A_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{14}[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{14}[\mathbb{Q}_0^{(a,A_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{3}$$

$$\boxed{\text{No. 59}} \quad \hat{\mathbb{Q}}_0^{(A_g)}(1, 1) [\text{M}_3, \text{B}_4]$$

$$\hat{\mathbb{Z}}_{59} = \mathbb{X}_{15}[\mathbb{Q}_0^{(a,A_g)}(1, 1)] \otimes \mathbb{Y}_{40}[\mathbb{Q}_0^{(b,A_g)}]$$

$$\hat{\mathbb{Z}}_{59}(\mathbf{k}) = \frac{\sqrt{3}\mathbb{X}_{15}[\mathbb{Q}_0^{(a,A_g)}(1, 1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{25}[\mathbb{Q}_0^{(k,A_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{15}[\mathbb{Q}_0^{(a,A_g)}(1, 1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{3} + \frac{\sqrt{3}\mathbb{X}_{15}[\mathbb{Q}_0^{(a,A_g)}(1, 1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{3}$$

$$\boxed{\text{No. 60}} \quad \hat{\mathbb{Q}}_0^{(A_g)} [\text{M}_3, \text{B}_4]$$

$$\hat{\mathbb{Z}}_{60} = \frac{\sqrt{2}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{Y}_{41}[\mathbb{Q}_{2,0}^{(b,E_g)}]}{2} + \frac{\sqrt{2}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{Y}_{42}[\mathbb{Q}_{2,1}^{(b,E_g)}]}{2}$$

$$\begin{aligned}
\hat{Z}_{60}(\mathbf{k}) = & \frac{\sqrt{6}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{6} + \frac{\sqrt{6}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{25}[\mathbb{Q}_0^{(k,A_g)}]}{6} + \frac{143\sqrt{3}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} \\
& + \frac{90\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} + \frac{90\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{3}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} \\
& + \frac{\sqrt{6}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{6} + \frac{90\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{3}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} \\
& + \frac{\sqrt{6}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{25}[\mathbb{Q}_0^{(k,A_g)}]}{6} - \frac{143\sqrt{3}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} - \frac{90\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343}
\end{aligned}$$

$$\boxed{\text{No. 61}} \quad \hat{\mathbb{G}}_3^{(A_g)} [\text{M}_3, \text{B}_4]$$

$$\hat{Z}_{61} = \frac{\sqrt{2}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{Y}_{42}[\mathbb{Q}_{2,1}^{(b,E_g)}]}{2} - \frac{\sqrt{2}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{Y}_{41}[\mathbb{Q}_{2,0}^{(b,E_g)}]}{2}$$

$$\begin{aligned}
\hat{Z}_{61}(\mathbf{k}) = & \frac{\sqrt{6}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{6} + \frac{90\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{3}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} \\
& + \frac{\sqrt{6}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{25}[\mathbb{Q}_0^{(k,A_g)}]}{6} - \frac{143\sqrt{3}\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} - \frac{90\mathbb{X}_{16}[\mathbb{Q}_{2,0}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\
& - \frac{\sqrt{6}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{6} - \frac{\sqrt{6}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{25}[\mathbb{Q}_0^{(k,A_g)}]}{6} - \frac{143\sqrt{3}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} \\
& - \frac{90\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} - \frac{90\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} + \frac{143\sqrt{3}\mathbb{X}_{17}[\mathbb{Q}_{2,1}^{(a,E_g)}] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058}
\end{aligned}$$

$$\boxed{\text{No. 62}} \quad \hat{\mathbb{Q}}_0^{(A_g)}(1, -1) [\text{M}_3, \text{B}_4]$$

$$\hat{Z}_{62} = \frac{\sqrt{2}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1, -1)] \otimes \mathbb{Y}_{41}[\mathbb{Q}_{2,0}^{(b,E_g)}]}{2} + \frac{\sqrt{2}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1, -1)] \otimes \mathbb{Y}_{42}[\mathbb{Q}_{2,1}^{(b,E_g)}]}{2}$$

$$\begin{aligned}
\hat{Z}_{62}(\mathbf{k}) = & \frac{\sqrt{6}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{6} + \frac{\sqrt{6}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{25}[\mathbb{Q}_0^{(k,A_g)}]}{6} \\
& + \frac{143\sqrt{3}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} + \frac{90\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\
& + \frac{90\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} - \frac{143\sqrt{3}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} \\
& + \frac{\sqrt{6}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{6} + \frac{90\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} \\
& - \frac{143\sqrt{3}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} + \frac{\sqrt{6}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{25}[\mathbb{Q}_0^{(k,A_g)}]}{6} \\
& - \frac{143\sqrt{3}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} - \frac{90\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343}
\end{aligned}$$

$$\boxed{\text{No. 63}} \quad \hat{\mathbb{G}}_3^{(A_g)}(1,-1) [\text{M}_3, \text{B}_4]$$

$$\hat{Z}_{63} = \frac{\sqrt{2}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{Y}_{42}[\mathbb{Q}_{2,1}^{(b,E_g)}]}{2} - \frac{\sqrt{2}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{Y}_{41}[\mathbb{Q}_{2,0}^{(b,E_g)}]}{2}$$

$$\begin{aligned}
\hat{Z}_{63}(\mathbf{k}) = & \frac{\sqrt{6}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{6} + \frac{90\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} \\
& - \frac{143\sqrt{3}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058} + \frac{\sqrt{6}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{25}[\mathbb{Q}_0^{(k,A_g)}]}{6} \\
& - \frac{143\sqrt{3}\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} - \frac{90\mathbb{X}_{21}[\mathbb{Q}_{2,0}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\
& - \frac{\sqrt{6}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_1[\mathbb{Q}_0^{(s,A_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{6} - \frac{\sqrt{6}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{25}[\mathbb{Q}_0^{(k,A_g)}]}{6} \\
& - \frac{143\sqrt{3}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{2058} - \frac{90\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_2[\mathbb{Q}_{2,0}^{(s,E_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{343} \\
& - \frac{90\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{26}[\mathbb{Q}_{2,0}^{(k,E_g)}]}{343} + \frac{143\sqrt{3}\mathbb{X}_{22}[\mathbb{Q}_{2,1}^{(a,E_g)}(1,-1)] \otimes \mathbb{U}_3[\mathbb{Q}_{2,1}^{(s,E_g)}] \otimes \mathbb{F}_{27}[\mathbb{Q}_{2,1}^{(k,E_g)}]}{2058}
\end{aligned}$$

Table 5: Atomic SAMB group.

group	bra	ket
M <sub>1</sub>	$(s, \uparrow), (s, \downarrow)$	$(s, \uparrow), (s, \downarrow)$
M <sub>2</sub>	$(s, \uparrow), (s, \downarrow)$	$(p_x, \uparrow), (p_x, \downarrow), (p_y, \uparrow), (p_y, \downarrow), (p_z, \uparrow), (p_z, \downarrow)$
M <sub>3</sub>	$(p_x, \uparrow), (p_x, \downarrow), (p_y, \uparrow), (p_y, \downarrow), (p_z, \uparrow), (p_z, \downarrow)$	$(p_x, \uparrow), (p_x, \downarrow), (p_y, \uparrow), (p_y, \downarrow), (p_z, \uparrow), (p_z, \downarrow)$
M <sub>4</sub>	$(p_x, \uparrow), (p_x, \downarrow), (p_y, \uparrow), (p_y, \downarrow), (p_z, \uparrow), (p_z, \downarrow)$	$(s, \uparrow), (s, \downarrow)$

Table 6: Atomic SAMB.

symbol	type	group	form
X <sub>1</sub>	$\mathbb{Q}_0^{(a, A_g)}$	M <sub>1</sub>	$\begin{pmatrix} \frac{\sqrt{2}}{2} & 0 \\ 0 & \frac{\sqrt{2}}{2} \end{pmatrix}$
X <sub>2</sub>	$\mathbb{M}_{1,0}^{(a, T_g)}(1, -1)$	M <sub>1</sub>	$\begin{pmatrix} 0 & \frac{\sqrt{2}}{2} \\ \frac{\sqrt{2}}{2} & 0 \end{pmatrix}$
X <sub>3</sub>	$\mathbb{M}_{1,1}^{(a, T_g)}(1, -1)$	M <sub>1</sub>	$\begin{pmatrix} 0 & -\frac{\sqrt{2}i}{2} \\ \frac{\sqrt{2}i}{2} & 0 \end{pmatrix}$
X <sub>4</sub>	$\mathbb{M}_{1,2}^{(a, T_g)}(1, -1)$	M <sub>1</sub>	$\begin{pmatrix} \frac{\sqrt{2}}{2} & 0 \\ 0 & -\frac{\sqrt{2}}{2} \end{pmatrix}$
X <sub>5</sub>	$\mathbb{Q}_{1,0}^{(a, T_u)}$	M <sub>2</sub>	$\begin{pmatrix} \frac{\sqrt{2}}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}}{2} & 0 & 0 & 0 & 0 \end{pmatrix}$
X <sub>6</sub>	$\mathbb{Q}_{1,1}^{(a, T_u)}$	M <sub>2</sub>	$\begin{pmatrix} 0 & 0 & \frac{\sqrt{2}}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}}{2} & 0 & 0 \end{pmatrix}$
X <sub>7</sub>	$\mathbb{Q}_{1,2}^{(a, T_u)}$	M <sub>2</sub>	$\begin{pmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{2} \end{pmatrix}$
X <sub>8</sub>	$\mathbb{Q}_{1,0}^{(a, T_u)}(1, 0)$	M <sub>2</sub>	$\begin{pmatrix} 0 & 0 & -\frac{i}{2} & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 0 & \frac{i}{2} & -\frac{1}{2} & 0 \end{pmatrix}$
X <sub>9</sub>	$\mathbb{Q}_{1,1}^{(a, T_u)}(1, 0)$	M <sub>2</sub>	$\begin{pmatrix} \frac{i}{2} & 0 & 0 & 0 & 0 & -\frac{i}{2} \\ 0 & -\frac{i}{2} & 0 & 0 & -\frac{i}{2} & 0 \end{pmatrix}$
X <sub>10</sub>	$\mathbb{Q}_{1,2}^{(a, T_u)}(1, 0)$	M <sub>2</sub>	$\begin{pmatrix} 0 & -\frac{1}{2} & 0 & \frac{i}{2} & 0 & 0 \\ \frac{1}{2} & 0 & \frac{i}{2} & 0 & 0 & 0 \end{pmatrix}$

continued ...

Table 6

symbol	type	group	form
$\mathbb{X}_{11}$	$\mathbb{M}_{2,0}^{(a,T_u)}(1,-1)$	$M_2$	$\begin{pmatrix} 0 & 0 & \frac{1}{2} & 0 & 0 & -\frac{i}{2} \\ 0 & 0 & 0 & -\frac{1}{2} & \frac{i}{2} & 0 \end{pmatrix}$
$\mathbb{X}_{12}$	$\mathbb{M}_{2,1}^{(a,T_u)}(1,-1)$	$M_2$	$\begin{pmatrix} \frac{1}{2} & 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & -\frac{1}{2} & 0 & 0 & \frac{1}{2} & 0 \end{pmatrix}$
$\mathbb{X}_{13}$	$\mathbb{M}_{2,2}^{(a,T_u)}(1,-1)$	$M_2$	$\begin{pmatrix} 0 & -\frac{i}{2} & 0 & \frac{1}{2} & 0 & 0 \\ \frac{i}{2} & 0 & \frac{1}{2} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{14}$	$\mathbb{Q}_0^{(a,A_g)}$	$M_3$	$\begin{pmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} \end{pmatrix}$
$\mathbb{X}_{15}$	$\mathbb{Q}_0^{(a,A_g)}(1,1)$	$M_3$	$\begin{pmatrix} 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}}{6} & 0 \\ \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 \\ 0 & -\frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 \\ \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{16}$	$\mathbb{Q}_{2,0}^{(a,E_g)}$	$M_3$	$\begin{pmatrix} -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{3} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{3} \end{pmatrix}$
$\mathbb{X}_{17}$	$\mathbb{Q}_{2,1}^{(a,E_g)}$	$M_3$	$\begin{pmatrix} \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{2} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$

continued ...

Table 6

symbol	type	group	form
$\mathbb{X}_{18}$	$\mathbb{Q}_{2,0}^{(a,T_g)}$	$M_3$	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{2} & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{19}$	$\mathbb{Q}_{2,1}^{(a,T_g)}$	$M_3$	$\begin{pmatrix} 0 & 0 & 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{20}$	$\mathbb{Q}_{2,2}^{(a,T_g)}$	$M_3$	$\begin{pmatrix} 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{2} & 0 & 0 \\ \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{21}$	$\mathbb{Q}_{2,0}^{(a,E_g)}(1, -1)$	$M_3$	$\begin{pmatrix} 0 & 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & 0 & 0 & \frac{\sqrt{6}i}{6} & \frac{\sqrt{6}}{12} & 0 \\ \frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{12} \\ 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & \frac{\sqrt{6}i}{12} & 0 \\ 0 & \frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 \\ -\frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{22}$	$\mathbb{Q}_{2,1}^{(a,E_g)}(1, -1)$	$M_3$	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{pmatrix}$

continued ...



Table 6

symbol	type	group	form
$\mathbb{X}_{23}$	$\mathbb{Q}_{2,0}^{(a,T_g)}(1,-1)$	$M_3$	$\begin{pmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & \frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{24}$	$\mathbb{Q}_{2,1}^{(a,T_g)}(1,-1)$	$M_3$	$\begin{pmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{25}$	$\mathbb{Q}_{2,2}^{(a,T_g)}(1,-1)$	$M_3$	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{26}$	$\mathbb{G}_{1,0}^{(a,T_g)}(1,0)$	$M_3$	$\begin{pmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{27}$	$\mathbb{G}_{1,1}^{(a,T_g)}(1,0)$	$M_3$	$\begin{pmatrix} 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \end{pmatrix}$

continued ...

Table 6

symbol	type	group	form
$\mathbb{X}_{28}$	$\mathbb{G}_{1,2}^{(a,T_g)}(1,0)$	$M_3$	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{29}$	$\mathbb{M}_{1,0}^{(a,T_g)}$	$M_3$	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{i}{2} \\ 0 & 0 & \frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{2} & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{30}$	$\mathbb{M}_{1,1}^{(a,T_g)}$	$M_3$	$\begin{pmatrix} 0 & 0 & 0 & 0 & \frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{i}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{i}{2} & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{31}$	$\mathbb{M}_{1,2}^{(a,T_g)}$	$M_3$	$\begin{pmatrix} 0 & 0 & -\frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{i}{2} & 0 & 0 \\ \frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{32}$	$\mathbb{M}_{1,0}^{(a,T_g)}(1,1)$	$M_3$	$\begin{pmatrix} 0 & \frac{\sqrt{30}}{15} & 0 & -\frac{\sqrt{30}i}{20} & \frac{\sqrt{30}}{20} & 0 \\ \frac{\sqrt{30}}{15} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{30}}{20} \\ 0 & -\frac{\sqrt{30}i}{20} & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 \\ \frac{\sqrt{30}i}{20} & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 & 0 \\ \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{30} \\ 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & -\frac{\sqrt{30}}{30} & 0 \end{pmatrix}$

continued ...

Table 6

symbol	type	group	form
$\mathbb{X}_{33}$	$\mathbb{M}_{1,1}^{(a,T_g)}(1,1)$	$M_3$	$\begin{pmatrix} 0 & \frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{20} & 0 & 0 \\ -\frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{30}i}{15} & \frac{\sqrt{30}}{20} & 0 \\ \frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{15} & 0 & 0 & -\frac{\sqrt{30}}{20} \\ 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & \frac{\sqrt{30}i}{30} \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{20} & -\frac{\sqrt{30}i}{30} & 0 \end{pmatrix}$
$\mathbb{X}_{34}$	$\mathbb{M}_{1,2}^{(a,T_g)}(1,1)$	$M_3$	$\begin{pmatrix} -\frac{\sqrt{30}}{30} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} \\ 0 & \frac{\sqrt{30}}{30} & 0 & 0 & \frac{\sqrt{30}}{20} & 0 \\ 0 & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 & -\frac{\sqrt{30}i}{20} \\ 0 & 0 & 0 & \frac{\sqrt{30}}{30} & \frac{\sqrt{30}i}{20} & 0 \\ 0 & \frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{30}i}{20} & \frac{\sqrt{30}}{15} & 0 \\ \frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{30}}{15} \end{pmatrix}$
$\mathbb{X}_{35}$	$\mathbb{M}_{1,0}^{(a,T_g)}(1,-1)$	$M_3$	$\begin{pmatrix} 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \end{pmatrix}$
$\mathbb{X}_{36}$	$\mathbb{M}_{1,1}^{(a,T_g)}(1,-1)$	$M_3$	$\begin{pmatrix} 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}i}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{6} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{6} & 0 \end{pmatrix}$
$\mathbb{X}_{37}$	$\mathbb{M}_{1,2}^{(a,T_g)}(1,-1)$	$M_3$	$\begin{pmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{6} \end{pmatrix}$

continued ...

Table 6

symbol	type	group	form
$\mathbb{X}_{38}$	$\mathbb{M}_{3,0}^{(a,T_g,1)}(1,-1)$	$M_3$	$\begin{pmatrix} 0 & \frac{\sqrt{5}}{5} & 0 & \frac{\sqrt{5}i}{10} & -\frac{\sqrt{5}}{10} & 0 \\ \frac{\sqrt{5}}{5} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & \frac{\sqrt{5}}{10} \\ 0 & \frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 \\ -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 \\ -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} \\ 0 & \frac{\sqrt{5}}{10} & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 \end{pmatrix}$
$\mathbb{X}_{39}$	$\mathbb{M}_{3,1}^{(a,T_g,1)}(1,-1)$	$M_3$	$\begin{pmatrix} 0 & \frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 \\ -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{5}i}{5} & -\frac{\sqrt{5}}{10} & 0 \\ -\frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{5}i}{5} & 0 & 0 & \frac{\sqrt{5}}{10} \\ 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{5}i}{10} \\ 0 & 0 & 0 & \frac{\sqrt{5}}{10} & -\frac{\sqrt{5}i}{10} & 0 \end{pmatrix}$
$\mathbb{X}_{40}$	$\mathbb{M}_{3,2}^{(a,T_g,1)}(1,-1)$	$M_3$	$\begin{pmatrix} -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} \\ 0 & \frac{\sqrt{5}}{10} & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 \\ 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{5}i}{10} \\ 0 & 0 & 0 & \frac{\sqrt{5}}{10} & -\frac{\sqrt{5}i}{10} & 0 \\ 0 & -\frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{5}i}{10} & \frac{\sqrt{5}}{5} & 0 \\ -\frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & -\frac{\sqrt{5}}{5} \end{pmatrix}$
$\mathbb{X}_{41}$	$\mathbb{M}_{3,0}^{(a,T_g,2)}(1,-1)$	$M_3$	$\begin{pmatrix} 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}}{6} & 0 \\ 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 \\ \frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} \\ 0 & \frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 \end{pmatrix}$
$\mathbb{X}_{42}$	$\mathbb{M}_{3,1}^{(a,T_g,2)}(1,-1)$	$M_3$	$\begin{pmatrix} 0 & \frac{\sqrt{3}i}{6} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 \\ -\frac{\sqrt{3}i}{6} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} \\ 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & \frac{\sqrt{3}i}{6} & 0 \end{pmatrix}$

continued ...

Table 6

symbol	type	group	form
$\mathbb{X}_{43}$	$\mathbb{M}_{3,2}^{(a,T_g,2)}(1,-1)$	$M_3$	$\begin{pmatrix} \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}i}{6} \\ 0 & 0 & 0 & \frac{\sqrt{3}}{6} & -\frac{\sqrt{3}i}{6} & 0 \\ 0 & \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 \\ \frac{\sqrt{3}}{6} & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{44}$	$\mathbb{T}_{2,0}^{(a,T_g)}(1,0)$	$M_3$	$\begin{pmatrix} 0 & 0 & 0 & \frac{\sqrt{6}i}{12} & \frac{\sqrt{6}}{12} & 0 \\ 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & \frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{6} \\ 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}}{6} & 0 \end{pmatrix}$
$\mathbb{X}_{45}$	$\mathbb{T}_{2,1}^{(a,T_g)}(1,0)$	$M_3$	$\begin{pmatrix} 0 & \frac{\sqrt{6}i}{6} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 \\ -\frac{\sqrt{6}i}{6} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 \\ \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} \\ 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}i}{6} \\ 0 & 0 & 0 & \frac{\sqrt{6}}{12} & \frac{\sqrt{6}i}{6} & 0 \end{pmatrix}$
$\mathbb{X}_{46}$	$\mathbb{T}_{2,2}^{(a,T_g)}(1,0)$	$M_3$	$\begin{pmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 \\ 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{6}i}{12} \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}i}{12} & 0 \\ 0 & -\frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 \\ -\frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{47}$	$\mathbb{M}_3^{(a,A_g)}(1,-1)$	$M_3$	$\begin{pmatrix} 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & \frac{\sqrt{3}i}{6} & 0 \\ \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 \\ \frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 \end{pmatrix}$

continued ...

Table 6

symbol	type	group	form
$\mathbb{X}_{48}$	$\mathbb{T}_{2,0}^{(a, E_g)}(1, 0)$	$M_3$	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{49}$	$\mathbb{T}_{2,1}^{(a, E_g)}(1, 0)$	$M_3$	$\begin{pmatrix} 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{6}i}{12} \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}i}{12} & 0 \\ -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & \frac{\sqrt{6}}{12} & 0 \\ 0 & -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 \\ \frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{50}$	$\mathbb{Q}_{1,0}^{(a, T_u)}$	$M_4$	$\begin{pmatrix} \frac{\sqrt{2}}{2} & 0 \\ 0 & \frac{\sqrt{2}}{2} \\ 0 & 0 \\ 0 & 0 \\ 0 & 0 \\ 0 & 0 \end{pmatrix}$
$\mathbb{X}_{51}$	$\mathbb{Q}_{1,1}^{(a, T_u)}$	$M_4$	$\begin{pmatrix} 0 & 0 \\ 0 & 0 \\ \frac{\sqrt{2}}{2} & 0 \\ 0 & \frac{\sqrt{2}}{2} \\ 0 & 0 \\ 0 & 0 \end{pmatrix}$
$\mathbb{X}_{52}$	$\mathbb{Q}_{1,2}^{(a, T_u)}$	$M_4$	$\begin{pmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 0 \\ 0 & 0 \\ \frac{\sqrt{2}}{2} & 0 \\ 0 & \frac{\sqrt{2}}{2} \end{pmatrix}$

continued ...

Table 6

symbol	type	group	form
$\mathbb{X}_{53}$	$\mathbb{Q}_{1,0}^{(a,T_u)}(1,0)$	$M_4$	$\begin{pmatrix} 0 & 0 \\ 0 & 0 \\ \frac{i}{2} & 0 \\ 0 & -\frac{i}{2} \\ 0 & -\frac{1}{2} \\ \frac{1}{2} & 0 \end{pmatrix}$
$\mathbb{X}_{54}$	$\mathbb{Q}_{1,1}^{(a,T_u)}(1,0)$	$M_4$	$\begin{pmatrix} -\frac{i}{2} & 0 \\ 0 & \frac{i}{2} \\ 0 & 0 \\ 0 & 0 \\ 0 & \frac{i}{2} \\ \frac{i}{2} & 0 \end{pmatrix}$
$\mathbb{X}_{55}$	$\mathbb{Q}_{1,2}^{(a,T_u)}(1,0)$	$M_4$	$\begin{pmatrix} 0 & \frac{1}{2} \\ -\frac{1}{2} & 0 \\ 0 & -\frac{i}{2} \\ -\frac{i}{2} & 0 \\ 0 & 0 \\ 0 & 0 \end{pmatrix}$
$\mathbb{X}_{56}$	$\mathbb{M}_{2,0}^{(a,T_u)}(1,-1)$	$M_4$	$\begin{pmatrix} 0 & 0 \\ 0 & 0 \\ \frac{1}{2} & 0 \\ 0 & -\frac{1}{2} \\ 0 & -\frac{i}{2} \\ \frac{i}{2} & 0 \end{pmatrix}$
$\mathbb{X}_{57}$	$\mathbb{M}_{2,1}^{(a,T_u)}(1,-1)$	$M_4$	$\begin{pmatrix} \frac{1}{2} & 0 \\ 0 & -\frac{1}{2} \\ 0 & 0 \\ 0 & 0 \\ 0 & \frac{1}{2} \\ \frac{1}{2} & 0 \end{pmatrix}$

continued ...

Table 6

symbol	type	group	form
$\mathbb{X}_{58}$	$\mathbb{M}_{2,2}^{(a,T_u)}(1, -1)$	$M_4$	$\begin{pmatrix} 0 & -\frac{i}{2} \\ \frac{i}{2} & 0 \\ 0 & \frac{1}{2} \\ \frac{1}{2} & 0 \\ 0 & 0 \\ 0 & 0 \end{pmatrix}$

Table 7: Cluster SAMB.

symbol	type	cluster	form
$Y_1$	$\mathbb{Q}_0^{(s,Ag)}$	$S_1$	$\begin{pmatrix} \frac{\sqrt{3}}{3} & \frac{\sqrt{3}}{3} & \frac{\sqrt{3}}{3} \end{pmatrix}$
$Y_2$	$\mathbb{Q}_{2,0}^{(s,Ag)}$	$S_1$	$\begin{pmatrix} -\frac{11\sqrt{6}}{42} & -\frac{\sqrt{6}}{21} & \frac{13\sqrt{6}}{42} \end{pmatrix}$
$Y_3$	$\mathbb{Q}_{2,1}^{(s,Ag)}$	$S_1$	$\begin{pmatrix} \frac{5\sqrt{2}}{14} & -\frac{4\sqrt{2}}{7} & \frac{3\sqrt{2}}{14} \end{pmatrix}$
$Y_4$	$\mathbb{Q}_0^{(b,Ag)}$	$B_1$	$\begin{pmatrix} \frac{\sqrt{3}}{6} & \frac{\sqrt{3}}{6} & \frac{\sqrt{3}}{6} & \frac{\sqrt{3}}{6} & \frac{\sqrt{3}}{6} & \frac{\sqrt{3}}{6} & \frac{\sqrt{3}}{6} & \frac{\sqrt{3}}{6} & \frac{\sqrt{3}}{6} & \frac{\sqrt{3}}{6} & \frac{\sqrt{3}}{6} & \frac{\sqrt{3}}{6} \end{pmatrix}$
$Y_5$	$\mathbb{Q}_{1,0}^{(b,T_u)}$	$B_1$	$\begin{pmatrix} \frac{3\sqrt{13}}{26} & -\frac{3\sqrt{13}}{26} & \frac{3\sqrt{13}}{26} & -\frac{3\sqrt{13}}{26} & 0 & 0 & 0 & 0 & \frac{\sqrt{13}}{13} & -\frac{\sqrt{13}}{13} & -\frac{\sqrt{13}}{13} & \frac{\sqrt{13}}{13} \end{pmatrix}$
$Y_6$	$\mathbb{Q}_{1,1}^{(b,T_u)}$	$B_1$	$\begin{pmatrix} \frac{\sqrt{13}}{13} & -\frac{\sqrt{13}}{13} & -\frac{\sqrt{13}}{13} & \frac{\sqrt{13}}{13} & \frac{3\sqrt{13}}{26} & -\frac{3\sqrt{13}}{26} & -\frac{3\sqrt{13}}{26} & \frac{3\sqrt{13}}{26} & 0 & 0 & 0 & 0 \end{pmatrix}$
$Y_7$	$\mathbb{Q}_{1,2}^{(b,T_u)}$	$B_1$	$\begin{pmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{13}}{13} & \frac{\sqrt{13}}{13} & -\frac{\sqrt{13}}{13} & -\frac{\sqrt{13}}{13} & \frac{3\sqrt{13}}{26} & -\frac{3\sqrt{13}}{26} & \frac{3\sqrt{13}}{26} & -\frac{3\sqrt{13}}{26} \end{pmatrix}$
$Y_8$	$\mathbb{Q}_{2,0}^{(b,Ag)}$	$B_1$	$\begin{pmatrix} -\frac{11\sqrt{6}}{84} & -\frac{11\sqrt{6}}{84} & -\frac{11\sqrt{6}}{84} & -\frac{11\sqrt{6}}{84} & -\frac{\sqrt{6}}{42} & -\frac{\sqrt{6}}{42} & -\frac{\sqrt{6}}{42} & -\frac{\sqrt{6}}{42} & \frac{13\sqrt{6}}{84} & \frac{13\sqrt{6}}{84} & \frac{13\sqrt{6}}{84} & \frac{13\sqrt{6}}{84} \end{pmatrix}$
$Y_9$	$\mathbb{Q}_{2,1}^{(b,Ag)}$	$B_1$	$\begin{pmatrix} \frac{5\sqrt{2}}{28} & \frac{5\sqrt{2}}{28} & \frac{5\sqrt{2}}{28} & \frac{5\sqrt{2}}{28} & -\frac{2\sqrt{2}}{7} & -\frac{2\sqrt{2}}{7} & -\frac{2\sqrt{2}}{7} & -\frac{2\sqrt{2}}{7} & \frac{3\sqrt{2}}{28} & \frac{3\sqrt{2}}{28} & \frac{3\sqrt{2}}{28} & \frac{3\sqrt{2}}{28} \end{pmatrix}$
$Y_{10}$	$\mathbb{Q}_{2,0}^{(b,T_g)}$	$B_1$	$\begin{pmatrix} 0 & 0 & 0 & 0 & \frac{1}{2} & -\frac{1}{2} & \frac{1}{2} & -\frac{1}{2} & 0 & 0 & 0 & 0 \end{pmatrix}$
$Y_{11}$	$\mathbb{Q}_{2,1}^{(b,T_g)}$	$B_1$	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{2} & \frac{1}{2} & -\frac{1}{2} & -\frac{1}{2} \end{pmatrix}$
$Y_{12}$	$\mathbb{Q}_{2,2}^{(b,T_g)}$	$B_1$	$\begin{pmatrix} \frac{1}{2} & \frac{1}{2} & -\frac{1}{2} & -\frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$Y_{13}$	$\mathbb{Q}_{3,0}^{(b,T_u,1)}$	$B_1$	$\begin{pmatrix} \frac{\sqrt{13}}{13} & -\frac{\sqrt{13}}{13} & \frac{\sqrt{13}}{13} & -\frac{\sqrt{13}}{13} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{13}}{26} & \frac{3\sqrt{13}}{26} & \frac{3\sqrt{13}}{26} & -\frac{3\sqrt{13}}{26} \end{pmatrix}$
$Y_{14}$	$\mathbb{Q}_{3,1}^{(b,T_u,1)}$	$B_1$	$\begin{pmatrix} -\frac{3\sqrt{13}}{26} & \frac{3\sqrt{13}}{26} & \frac{3\sqrt{13}}{26} & -\frac{3\sqrt{13}}{26} & \frac{\sqrt{13}}{13} & -\frac{\sqrt{13}}{13} & -\frac{\sqrt{13}}{13} & \frac{\sqrt{13}}{13} & 0 & 0 & 0 & 0 \end{pmatrix}$
$Y_{15}$	$\mathbb{Q}_{3,2}^{(b,T_u,1)}$	$B_1$	$\begin{pmatrix} 0 & 0 & 0 & 0 & -\frac{3\sqrt{13}}{26} & -\frac{3\sqrt{13}}{26} & \frac{3\sqrt{13}}{26} & \frac{3\sqrt{13}}{26} & \frac{\sqrt{13}}{13} & -\frac{\sqrt{13}}{13} & \frac{\sqrt{13}}{13} & -\frac{\sqrt{13}}{13} \end{pmatrix}$
$Y_{16}$	$\mathbb{T}_0^{(b,Ag)}$	$B_1$	$\begin{pmatrix} \frac{\sqrt{3}i}{6} & \frac{\sqrt{3}i}{6} & \frac{\sqrt{3}i}{6} & \frac{\sqrt{3}i}{6} & \frac{\sqrt{3}i}{6} & \frac{\sqrt{3}i}{6} & \frac{\sqrt{3}i}{6} & \frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}i}{6} \end{pmatrix}$
$Y_{17}$	$\mathbb{T}_{1,0}^{(b,T_u)}$	$B_1$	$\begin{pmatrix} \frac{3\sqrt{13}i}{26} & -\frac{3\sqrt{13}i}{26} & \frac{3\sqrt{13}i}{26} & -\frac{3\sqrt{13}i}{26} & 0 & 0 & 0 & 0 & -\frac{\sqrt{13}i}{13} & \frac{\sqrt{13}i}{13} & \frac{\sqrt{13}i}{13} & -\frac{\sqrt{13}i}{13} \end{pmatrix}$

continued ...



Table 7

symbol	type	cluster	form
Y <sub>18</sub>	$T_{1,1}^{(b,T_u)}$	B <sub>1</sub>	$\begin{pmatrix} \frac{\sqrt{13}i}{13} & -\frac{\sqrt{13}i}{13} & -\frac{\sqrt{13}i}{13} & \frac{\sqrt{13}i}{13} & \frac{3\sqrt{13}i}{26} & -\frac{3\sqrt{13}i}{26} & -\frac{3\sqrt{13}i}{26} & \frac{3\sqrt{13}i}{26} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{13}i}{13} & \frac{\sqrt{13}i}{13} & -\frac{\sqrt{13}i}{13} & -\frac{\sqrt{13}i}{13} & -\frac{3\sqrt{13}i}{26} & \frac{3\sqrt{13}i}{26} & -\frac{3\sqrt{13}i}{26} & \frac{3\sqrt{13}i}{26} \\ \left(-\frac{11\sqrt{6}i}{84} & -\frac{11\sqrt{6}i}{84} & -\frac{11\sqrt{6}i}{84} & -\frac{11\sqrt{6}i}{84} & -\frac{\sqrt{6}i}{42} & -\frac{\sqrt{6}i}{42} & -\frac{\sqrt{6}i}{42} & -\frac{\sqrt{6}i}{42} & -\frac{13\sqrt{6}i}{84} & -\frac{13\sqrt{6}i}{84} & -\frac{13\sqrt{6}i}{84} & -\frac{13\sqrt{6}i}{84}\right) \\ \left(\frac{5\sqrt{2}i}{28} & \frac{5\sqrt{2}i}{28} & \frac{5\sqrt{2}i}{28} & \frac{5\sqrt{2}i}{28} & -\frac{2\sqrt{2}i}{7} & -\frac{2\sqrt{2}i}{7} & -\frac{2\sqrt{2}i}{7} & -\frac{2\sqrt{2}i}{7} & -\frac{3\sqrt{2}i}{28} & -\frac{3\sqrt{2}i}{28} & -\frac{3\sqrt{2}i}{28} & -\frac{3\sqrt{2}i}{28}\right) \\ \left(0 & 0 & 0 & 0 & \frac{i}{2} & -\frac{i}{2} & \frac{i}{2} & -\frac{i}{2} & 0 & 0 & 0 & 0\right) \\ \left(0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{2} & -\frac{i}{2} & \frac{i}{2} & \frac{i}{2}\right) \\ \left(\frac{i}{2} & \frac{i}{2} & -\frac{i}{2} & -\frac{i}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0\right) \\ \left(\frac{\sqrt{13}i}{13} & -\frac{\sqrt{13}i}{13} & \frac{\sqrt{13}i}{13} & -\frac{\sqrt{13}i}{13} & 0 & 0 & 0 & 0 & \frac{3\sqrt{13}i}{26} & -\frac{3\sqrt{13}i}{26} & -\frac{3\sqrt{13}i}{26} & \frac{3\sqrt{13}i}{26}\right) \\ \left(-\frac{3\sqrt{13}i}{26} & \frac{3\sqrt{13}i}{26} & \frac{3\sqrt{13}i}{26} & -\frac{3\sqrt{13}i}{26} & \frac{\sqrt{13}i}{13} & -\frac{\sqrt{13}i}{13} & -\frac{\sqrt{13}i}{13} & \frac{\sqrt{13}i}{13} & 0 & 0 & 0 & 0\right) \\ \left(0 & 0 & 0 & 0 & -\frac{3\sqrt{13}i}{26} & -\frac{3\sqrt{13}i}{26} & \frac{3\sqrt{13}i}{26} & \frac{3\sqrt{13}i}{26} & -\frac{\sqrt{13}i}{13} & \frac{\sqrt{13}i}{13} & -\frac{\sqrt{13}i}{13} & \frac{\sqrt{13}i}{13}\right) \end{pmatrix}$
Y <sub>19</sub>	$T_{1,2}^{(b,T_u)}$	B <sub>1</sub>	
Y <sub>20</sub>	$T_{2,0}^{(b,E_g)}$	B <sub>1</sub>	
Y <sub>21</sub>	$T_{2,1}^{(b,E_g)}$	B <sub>1</sub>	
Y <sub>22</sub>	$T_{2,0}^{(b,T_g)}$	B <sub>1</sub>	
Y <sub>23</sub>	$T_{2,1}^{(b,T_g)}$	B <sub>1</sub>	
Y <sub>24</sub>	$T_{2,2}^{(b,T_g)}$	B <sub>1</sub>	
Y <sub>25</sub>	$T_{3,0}^{(b,T_u,1)}$	B <sub>1</sub>	
Y <sub>26</sub>	$T_{3,1}^{(b,T_u,1)}$	B <sub>1</sub>	
Y <sub>27</sub>	$T_{3,2}^{(b,T_u,1)}$	B <sub>1</sub>	
Y <sub>28</sub>	$Q_0^{(b,A_g)}$	B <sub>2</sub>	$\begin{pmatrix} \frac{\sqrt{3}}{3} & \frac{\sqrt{3}}{3} & \frac{\sqrt{3}}{3} \\ -\frac{11\sqrt{6}}{42} & -\frac{\sqrt{6}}{21} & \frac{13\sqrt{6}}{42} \\ \left(\frac{5\sqrt{2}}{14} & -\frac{4\sqrt{2}}{7} & \frac{3\sqrt{2}}{14}\right) \\ \begin{pmatrix} i & 0 & 0 \\ 0 & i & 0 \\ 0 & 0 & i \end{pmatrix} \end{pmatrix}$
Y <sub>29</sub>	$Q_{2,0}^{(b,E_g)}$	B <sub>2</sub>	
Y <sub>30</sub>	$Q_{2,1}^{(b,E_g)}$	B <sub>2</sub>	
Y <sub>31</sub>	$T_{1,0}^{(b,T_u)}$	B <sub>2</sub>	
Y <sub>32</sub>	$T_{1,1}^{(b,T_u)}$	B <sub>2</sub>	
Y <sub>33</sub>	$T_{1,2}^{(b,T_u)}$	B <sub>2</sub>	
Y <sub>34</sub>	$Q_0^{(b,A_g)}$	B <sub>3</sub>	$\begin{pmatrix} \frac{\sqrt{3}}{3} & \frac{\sqrt{3}}{3} & \frac{\sqrt{3}}{3} \\ -\frac{11\sqrt{6}}{42} & -\frac{\sqrt{6}}{21} & \frac{13\sqrt{6}}{42} \\ \left(\frac{5\sqrt{2}}{14} & -\frac{4\sqrt{2}}{7} & \frac{3\sqrt{2}}{14}\right) \\ \begin{pmatrix} 0 & 0 & i \\ i & 0 & 0 \\ 0 & i & 0 \end{pmatrix} \end{pmatrix}$
Y <sub>35</sub>	$Q_{2,0}^{(b,E_g)}$	B <sub>3</sub>	
Y <sub>36</sub>	$Q_{2,1}^{(b,E_g)}$	B <sub>3</sub>	
Y <sub>37</sub>	$T_{1,0}^{(b,T_u)}$	B <sub>3</sub>	
Y <sub>38</sub>	$T_{1,1}^{(b,T_u)}$	B <sub>3</sub>	
Y <sub>39</sub>	$T_{1,2}^{(b,T_u)}$	B <sub>3</sub>	
Y <sub>40</sub>	$Q_0^{(b,A_g)}$	B <sub>4</sub>	$\begin{pmatrix} \frac{\sqrt{3}}{3} & \frac{\sqrt{3}}{3} & \frac{\sqrt{3}}{3} \\ -\frac{11\sqrt{6}}{42} & -\frac{\sqrt{6}}{21} & \frac{13\sqrt{6}}{42} \\ \left(\frac{5\sqrt{2}}{14} & -\frac{4\sqrt{2}}{7} & \frac{3\sqrt{2}}{14}\right) \\ \begin{pmatrix} 0 & i & 0 \\ 0 & 0 & i \\ i & 0 & 0 \end{pmatrix} \end{pmatrix}$
Y <sub>41</sub>	$Q_{2,0}^{(b,E_g)}$	B <sub>4</sub>	
Y <sub>42</sub>	$Q_{2,1}^{(b,E_g)}$	B <sub>4</sub>	
Y <sub>43</sub>	$T_{1,0}^{(b,T_u)}$	B <sub>4</sub>	
Y <sub>44</sub>	$T_{1,1}^{(b,T_u)}$	B <sub>4</sub>	
Y <sub>45</sub>	$T_{1,2}^{(b,T_u)}$	B <sub>4</sub>	

Table 8: Uniform SAMB.

symbol	type	cluster	form
$\mathbb{U}_1$	$\mathbb{Q}_0^{(s, A_g)}$	$S_1$	$\begin{pmatrix} \frac{\sqrt{3}}{3} & 0 & 0 \\ 0 & \frac{\sqrt{3}}{3} & 0 \\ 0 & 0 & \frac{\sqrt{3}}{3} \end{pmatrix}$
$\mathbb{U}_2$	$\mathbb{Q}_{2,0}^{(s, E_g)}$	$S_1$	$\begin{pmatrix} -\frac{11\sqrt{6}}{42} & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{21} & 0 \\ 0 & 0 & \frac{13\sqrt{6}}{42} \end{pmatrix}$
$\mathbb{U}_3$	$\mathbb{Q}_{2,1}^{(s, E_g)}$	$S_1$	$\begin{pmatrix} \frac{5\sqrt{2}}{14} & 0 & 0 \\ 0 & -\frac{4\sqrt{2}}{7} & 0 \\ 0 & 0 & \frac{3\sqrt{2}}{14} \end{pmatrix}$
$\mathbb{U}_4$	$\mathbb{Q}_0^{(u, A_g)}$	$B_1$	$\begin{pmatrix} 0 & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}}{6} \\ \frac{\sqrt{6}}{6} & 0 & \frac{\sqrt{6}}{6} \\ \frac{\sqrt{6}}{6} & \frac{\sqrt{6}}{6} & 0 \end{pmatrix}$
$\mathbb{U}_5$	$\mathbb{Q}_{2,0}^{(u, E_g)}$	$B_1$	$\begin{pmatrix} 0 & -\frac{11\sqrt{3}}{42} & \frac{13\sqrt{3}}{42} \\ -\frac{11\sqrt{3}}{42} & 0 & -\frac{\sqrt{3}}{21} \\ \frac{13\sqrt{3}}{42} & -\frac{\sqrt{3}}{21} & 0 \end{pmatrix}$
$\mathbb{U}_6$	$\mathbb{Q}_{2,1}^{(u, E_g)}$	$B_1$	$\begin{pmatrix} 0 & \frac{5}{14} & \frac{3}{14} \\ \frac{5}{14} & 0 & -\frac{4}{7} \\ \frac{3}{14} & -\frac{4}{7} & 0 \end{pmatrix}$
$\mathbb{U}_7$	$\mathbb{T}_0^{(u, A_g)}$	$B_1$	$\begin{pmatrix} 0 & \frac{\sqrt{6}i}{6} & -\frac{\sqrt{6}i}{6} \\ -\frac{\sqrt{6}i}{6} & 0 & \frac{\sqrt{6}i}{6} \\ \frac{\sqrt{6}i}{6} & -\frac{\sqrt{6}i}{6} & 0 \end{pmatrix}$
$\mathbb{U}_8$	$\mathbb{T}_{2,0}^{(u, E_g)}$	$B_1$	$\begin{pmatrix} 0 & -\frac{11\sqrt{3}i}{42} & -\frac{13\sqrt{3}i}{42} \\ \frac{11\sqrt{3}i}{42} & 0 & -\frac{\sqrt{3}i}{21} \\ \frac{13\sqrt{3}i}{42} & \frac{\sqrt{3}i}{21} & 0 \end{pmatrix}$
$\mathbb{U}_9$	$\mathbb{T}_{2,1}^{(u, E_g)}$	$B_1$	$\begin{pmatrix} 0 & \frac{5i}{14} & -\frac{3i}{14} \\ -\frac{5i}{14} & 0 & -\frac{4i}{7} \\ \frac{3i}{14} & \frac{4i}{7} & 0 \end{pmatrix}$

Table 9: Structure SAMB.

symbol	type	cluster	form
F <sub>1</sub>	$\mathbb{Q}_0^{(k, A_g)}$	B <sub>1</sub>	$\frac{\sqrt{3}c_{001}}{3} + \frac{\sqrt{3}c_{003}}{3} + \frac{\sqrt{3}c_{005}}{3} + \frac{\sqrt{3}c_{006}}{3} + \frac{\sqrt{3}c_{009}}{3} + \frac{\sqrt{3}c_{011}}{3}$
F <sub>2</sub>	$\mathbb{Q}_{2,0}^{(k, E_g)}$	B <sub>1</sub>	$-\frac{11\sqrt{6}c_{001}}{42} - \frac{11\sqrt{6}c_{003}}{42} - \frac{\sqrt{6}c_{005}}{21} - \frac{\sqrt{6}c_{006}}{21} + \frac{13\sqrt{6}c_{009}}{42} + \frac{13\sqrt{6}c_{011}}{42}$
F <sub>3</sub>	$\mathbb{Q}_{2,1}^{(k, E_g)}$	B <sub>1</sub>	$\frac{5\sqrt{2}c_{001}}{14} + \frac{5\sqrt{2}c_{003}}{14} - \frac{4\sqrt{2}c_{005}}{7} - \frac{4\sqrt{2}c_{006}}{7} + \frac{3\sqrt{2}c_{009}}{14} + \frac{3\sqrt{2}c_{011}}{14}$
F <sub>4</sub>	$\mathbb{Q}_{2,0}^{(k, T_g)}$	B <sub>1</sub>	$c_{005} - c_{006}$
F <sub>5</sub>	$\mathbb{Q}_{2,1}^{(k, T_g)}$	B <sub>1</sub>	$c_{009} - c_{011}$
F <sub>6</sub>	$\mathbb{Q}_{2,2}^{(k, T_g)}$	B <sub>1</sub>	$c_{001} - c_{003}$
F <sub>7</sub>	$\mathbb{T}_{1,0}^{(k, T_u)}$	B <sub>1</sub>	$\frac{3\sqrt{13}s_{001}}{13} + \frac{3\sqrt{13}s_{003}}{13} - \frac{2\sqrt{13}s_{009}}{13} + \frac{2\sqrt{13}s_{011}}{13}$
F <sub>8</sub>	$\mathbb{T}_{1,1}^{(k, T_u)}$	B <sub>1</sub>	$\frac{2\sqrt{13}s_{001}}{13} - \frac{2\sqrt{13}s_{003}}{13} + \frac{3\sqrt{13}s_{005}}{13} - \frac{3\sqrt{13}s_{006}}{13}$
F <sub>9</sub>	$\mathbb{T}_{1,2}^{(k, T_u)}$	B <sub>1</sub>	$\frac{2\sqrt{13}s_{005}}{13} + \frac{2\sqrt{13}s_{006}}{13} - \frac{3\sqrt{13}s_{009}}{13} - \frac{3\sqrt{13}s_{011}}{13}$
F <sub>10</sub>	$\mathbb{T}_{3,0}^{(k, T_u, 1)}$	B <sub>1</sub>	$\frac{2\sqrt{13}s_{001}}{13} + \frac{2\sqrt{13}s_{003}}{13} + \frac{3\sqrt{13}s_{009}}{13} - \frac{3\sqrt{13}s_{011}}{13}$
F <sub>11</sub>	$\mathbb{T}_{3,1}^{(k, T_u, 1)}$	B <sub>1</sub>	$-\frac{3\sqrt{13}s_{001}}{13} + \frac{3\sqrt{13}s_{003}}{13} + \frac{2\sqrt{13}s_{005}}{13} - \frac{2\sqrt{13}s_{006}}{13}$
F <sub>12</sub>	$\mathbb{T}_{3,2}^{(k, T_u, 1)}$	B <sub>1</sub>	$-\frac{3\sqrt{13}s_{005}}{13} - \frac{3\sqrt{13}s_{006}}{13} - \frac{2\sqrt{13}s_{009}}{13} - \frac{2\sqrt{13}s_{011}}{13}$
F <sub>13</sub>	$\mathbb{Q}_0^{(k, A_g)}$	B <sub>2</sub>	$\frac{\sqrt{6}c_{013}}{3} + \frac{\sqrt{6}c_{014}}{3} + \frac{\sqrt{6}c_{015}}{3}$
F <sub>14</sub>	$\mathbb{Q}_{2,0}^{(k, E_g)}$	B <sub>2</sub>	$-\frac{11\sqrt{3}c_{013}}{21} - \frac{2\sqrt{3}c_{014}}{21} + \frac{13\sqrt{3}c_{015}}{21}$
F <sub>15</sub>	$\mathbb{Q}_{2,1}^{(k, E_g)}$	B <sub>2</sub>	$\frac{5c_{013}}{7} - \frac{8c_{014}}{7} + \frac{3c_{015}}{7}$
F <sub>16</sub>	$\mathbb{T}_{1,0}^{(k, T_u)}$	B <sub>2</sub>	$\sqrt{2}s_{013}$
F <sub>17</sub>	$\mathbb{T}_{1,1}^{(k, T_u)}$	B <sub>2</sub>	$\sqrt{2}s_{014}$
F <sub>18</sub>	$\mathbb{T}_{1,2}^{(k, T_u)}$	B <sub>2</sub>	$\sqrt{2}s_{015}$
F <sub>19</sub>	$\mathbb{Q}_0^{(k, A_g)}$	B <sub>3</sub>	$\frac{\sqrt{6}c_{016}}{3} + \frac{\sqrt{6}c_{017}}{3} + \frac{\sqrt{6}c_{018}}{3}$
F <sub>20</sub>	$\mathbb{Q}_{2,0}^{(k, E_g)}$	B <sub>3</sub>	$-\frac{11\sqrt{3}c_{016}}{21} - \frac{2\sqrt{3}c_{017}}{21} + \frac{13\sqrt{3}c_{018}}{21}$
F <sub>21</sub>	$\mathbb{Q}_{2,1}^{(k, E_g)}$	B <sub>3</sub>	$\frac{5c_{016}}{7} - \frac{8c_{017}}{7} + \frac{3c_{018}}{7}$
F <sub>22</sub>	$\mathbb{T}_{1,0}^{(k, T_u)}$	B <sub>3</sub>	$\sqrt{2}s_{018}$
F <sub>23</sub>	$\mathbb{T}_{1,1}^{(k, T_u)}$	B <sub>3</sub>	$\sqrt{2}s_{016}$
F <sub>24</sub>	$\mathbb{T}_{1,2}^{(k, T_u)}$	B <sub>3</sub>	$\sqrt{2}s_{017}$
F <sub>25</sub>	$\mathbb{Q}_0^{(k, A_g)}$	B <sub>4</sub>	$\frac{\sqrt{6}c_{019}}{3} + \frac{\sqrt{6}c_{020}}{3} + \frac{\sqrt{6}c_{021}}{3}$
F <sub>26</sub>	$\mathbb{Q}_{2,0}^{(k, E_g)}$	B <sub>4</sub>	$-\frac{11\sqrt{3}c_{019}}{21} - \frac{2\sqrt{3}c_{020}}{21} + \frac{13\sqrt{3}c_{021}}{21}$
F <sub>27</sub>	$\mathbb{Q}_{2,1}^{(k, E_g)}$	B <sub>4</sub>	$\frac{5c_{019}}{7} - \frac{8c_{020}}{7} + \frac{3c_{021}}{7}$
F <sub>28</sub>	$\mathbb{T}_{1,0}^{(k, T_u)}$	B <sub>4</sub>	$\sqrt{2}s_{020}$
F <sub>29</sub>	$\mathbb{T}_{1,1}^{(k, T_u)}$	B <sub>4</sub>	$\sqrt{2}s_{021}$
F <sub>30</sub>	$\mathbb{T}_{1,2}^{(k, T_u)}$	B <sub>4</sub>	$\sqrt{2}s_{019}$

Table 10: 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	$\frac{\sqrt{3}(x^2 - y^2)}{2}$
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	$\mathbb{Q}_{3,0}^{(T_u,1)}$	3	$T_u$	1	0	$\frac{x(2x^2 - 3y^2 - 3z^2)}{2}$
11	$\mathbb{Q}_{3,1}^{(T_u,1)}$	3	$T_u$	1	1	$-\frac{y(3x^2 - 2y^2 + 3z^2)}{2}$
12	$\mathbb{Q}_{3,2}^{(T_u,1)}$	3	$T_u$	1	2	$-\frac{z(3x^2 + 3y^2 - 2z^2)}{2}$

Table 11: Axial harmonics.

No.	symbol	rank	irrep.	mul.	comp.	form
1	$\mathbb{G}_{1,0}^{(T_g)}$	1	$T_g$	—	0	$X$
2	$\mathbb{G}_{1,1}^{(T_g)}$	1	$T_g$	—	1	$Y$
3	$\mathbb{G}_{1,2}^{(T_g)}$	1	$T_g$	—	2	$Z$
4	$\mathbb{G}_{2,0}^{(T_u)}$	2	$T_u$	—	0	$\sqrt{3}YZ$
5	$\mathbb{G}_{2,1}^{(T_u)}$	2	$T_u$	—	1	$\sqrt{3}XZ$
6	$\mathbb{G}_{2,2}^{(T_u)}$	2	$T_u$	—	2	$\sqrt{3}XY$
7	$\mathbb{G}_3^{(A_g)}$	3	$A_g$	—	—	$\sqrt{15}XYZ$
8	$\mathbb{G}_{3,0}^{(T_g,1)}$	3	$T_g$	1	0	$\frac{X(2X^2 - 3Y^2 - 3Z^2)}{2}$

continued ...

Table 11

No.	symbol	rank	irrep.	mul.	comp.	form
9	$\mathbb{G}_{3,1}^{(T_g,1)}$	3	$T_g$	1	1	$-\frac{Y(3X^2-2Y^2+3Z^2)}{2}$
10	$\mathbb{G}_{3,2}^{(T_g,1)}$	3	$T_g$	1	2	$-\frac{Z(3X^2+3Y^2-2Z^2)}{2}$
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 =  $\{2_{001}|0\}$ ,  $\{2_{010}|0\}$ ,  $\{3_{111}^+|0\}$ ,  $\{-1|0\}$

Table 12: Conjugacy class (point-group part).

rep. SO	symmetry operations
$\{1 0\}$	$\{1 0\}$
$\{2_{001} 0\}$	$\{2_{001} 0\}$ , $\{2_{100} 0\}$ , $\{2_{010} 0\}$
$\{3_{111}^+ 0\}$	$\{3_{111}^+ 0\}$ , $\{3_{1-1-1}^+ 0\}$ , $\{3_{-11-1}^+ 0\}$ , $\{3_{-1-11}^+ 0\}$
$\{3_{111}^- 0\}$	$\{3_{111}^- 0\}$ , $\{3_{1-1-1}^- 0\}$ , $\{3_{-11-1}^- 0\}$ , $\{3_{-1-11}^- 0\}$
$\{-1 0\}$	$\{-1 0\}$
$\{m_{001} 0\}$	$\{m_{001} 0\}$ , $\{m_{100} 0\}$ , $\{m_{010} 0\}$
$\{-3_{111}^+ 0\}$	$\{-3_{111}^+ 0\}$ , $\{-3_{1-1-1}^+ 0\}$ , $\{-3_{-11-1}^+ 0\}$ , $\{-3_{-1-11}^+ 0\}$
$\{-3_{111}^- 0\}$	$\{-3_{111}^- 0\}$ , $\{-3_{1-1-1}^- 0\}$ , $\{-3_{-11-1}^- 0\}$ , $\{-3_{-1-11}^- 0\}$

Table 13: Symmetry operations.

No.	SO	No.	SO	No.	SO	No.	SO	No.	SO
1	$\{1 0\}$	2	$\{2_{001} 0\}$	3	$\{2_{100} 0\}$	4	$\{2_{010} 0\}$	5	$\{3_{111}^+ 0\}$

*continued ...*

Table 13

No.	SO	No.	SO	No.	SO	No.	SO	No.	SO
6	$\{3_{1-1-1}^+ 0\}$	7	$\{3_{-11-1}^+ 0\}$	8	$\{3_{-1-11}^+ 0\}$	9	$\{3_{111}^- 0\}$	10	$\{3_{-1-1-1}^- 0\}$
11	$\{3_{-11-1}^- 0\}$	12	$\{3_{-1-11}^- 0\}$	13	$\{-1 0\}$	14	$\{m_{001} 0\}$	15	$\{m_{100} 0\}$
16	$\{m_{010} 0\}$	17	$\{-3_{111}^+ 0\}$	18	$\{-3_{1-1-1}^+ 0\}$	19	$\{-3_{-11-1}^+ 0\}$	20	$\{-3_{-1-11}^+ 0\}$
21	$\{-3_{111}^- 0\}$	22	$\{-3_{1-1-1}^- 0\}$	23	$\{-3_{-11-1}^- 0\}$	24	$\{-3_{-1-11}^- 0\}$		

Table 14: Character table (point-group part).

	1	2 <sub>001</sub>	3 <sub>111</sub> <sup>+</sup>	3 <sub>111</sub> <sup>-</sup>	-1	m <sub>001</sub>	-3 <sub>111</sub> <sup>+</sup>	-3 <sub>111</sub> <sup>-</sup>
$A_g$	1	1	1	1	1	1	1	1
$E_g^{(a)}$	1	1	$\omega^*$	$\omega$	1	1	$\omega^*$	$\omega$
$E_g^{(b)}$	1	1	$\omega$	$\omega^*$	1	1	$\omega$	$\omega^*$
$T_g$	3	-1	0	0	3	-1	0	0
$A_u$	1	1	1	1	-1	-1	-1	-1
$E_u^{(a)}$	1	1	$\omega^*$	$\omega$	-1	-1	$-\omega^*$	$-\omega$
$E_u^{(b)}$	1	1	$\omega$	$\omega^*$	-1	-1	$-\omega$	$-\omega^*$
$T_u$	3	-1	0	0	-3	1	0	0

Table 15: 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 16: Symmetric product,  $[\Gamma \otimes \Gamma']_+$ .

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

Table 17: 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 18: 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 19: Virtual-cluster basis.

[illegible]

*continued ...*



Table 19

[illegible]

*continued ...*

Table 19

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