

# Model for “kagome”

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## General Condition

- Basis type: **lgs**
- SAMB selection:
  - Type: **[Q, G]**
  - Rank: **[0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]**
  - Irrep.: **[ $A_g$ ,  $E_g$ ,  $A_u$ ,  $E_u$ ]**
  - Spin (s): **[0, 1]**
- Atomic selection:
  - Type: **[Q, G, M, T]**
  - Rank: **[0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]**
  - Irrep.: **[ $A_g$ ,  $E_g$ ,  $A_u$ ,  $E_u$ ]**
  - Spin (s): **[0, 1]**
- Site-cluster selection:
  - Rank: **[0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]**
  - Irrep.: **[ $A_g$ ,  $E_g$ ,  $A_u$ ,  $E_u$ ]**
- Bond-cluster selection:
  - Type: **[Q, G, M, T]**
  - Rank: **[0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]**
  - Irrep.: **[ $A_g$ ,  $E_g$ ,  $A_u$ ,  $E_u$ ]**
- Max. neighbor: **10**
- Search cell range: **(-2, 3), (-2, 3), (-2, 3)**
- Toroidal priority: **false**

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## Group and Unit Cell

- Group: SG No. 147  $C_{3i}^1 P\bar{3}$  [ trigonal ]
- Associated point group: PG No. 147  $C_{3i} \bar{3}$  [ trigonal ]
- Unit cell:
  - $a = 1.00000$ ,  $b = 1.00000$ ,  $c = 1.00000$ ,  $\alpha = 90.0$ ,  $\beta = 90.0$ ,  $\gamma = 120.0$
- Lattice vectors (conventional cell):
  - $\mathbf{a}_1 = [ 1.00000, 0.00000, 0.00000 ]$
  - $\mathbf{a}_2 = [ -0.50000, 0.86603, 0.00000 ]$
  - $\mathbf{a}_3 = [ 0.00000, 0.00000, 1.00000 ]$

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## Symmetry Operation

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Table 1: Symmetry operation

#	SO	#	SO	#	SO	#	SO	#	SO
1	$\{1 0\}$	2	$\{3^+_{001} 0\}$	3	$\{3^-_{001} 0\}$	4	$\{-1 0\}$	5	$\{-3^+_{001} 0\}$
6	$\{-3^-_{001} 0\}$								

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## Harmonics

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Table 2: Harmonics

#	symbol	irrep.	rank	X	multiplicity	component	symmetry
1	$\mathbb{Q}_0(A_g)$	$A_g$	0	$Q, T$	-	-	1
2	$\mathbb{G}_1(A_g)$	$A_g$	1	$G, M$	-	-	$z$
3	$\mathbb{Q}_2(A_g)$	$A_g$	2	$Q, T$	-	-	$-\frac{x^2}{2} - \frac{y^2}{2} + z^2$
4	$\mathbb{G}_3(A_g, 1)$	$A_g$	3	$G, M$	1	-	$-\frac{z(3x^2+3y^2-2z^2)}{2}$
5	$\mathbb{G}_3(A_g, 2)$	$A_g$	3	$G, M$	2	-	$\frac{\sqrt{10}y(3x^2-y^2)}{4}$
6	$\mathbb{G}_3(A_g, 3)$	$A_g$	3	$G, M$	3	-	$\frac{\sqrt{10}x(x^2-3y^2)}{4}$
7	$\mathbb{Q}_4(A_g, 2)$	$A_g$	4	$Q, T$	2	-	$\frac{\sqrt{70}xz(x^2-3y^2)}{4}$
8	$\mathbb{Q}_4(A_g, 3)$	$A_g$	4	$Q, T$	3	-	$\frac{\sqrt{70}yz(3x^2-y^2)}{4}$

*continued ...*

Table 2

#	symbol	irrep.	rank	X	multiplicity	component	symmetry
9	$\mathbb{G}_0(A_u)$	$A_u$	0	$G, M$	-	-	1
10	$\mathbb{Q}_1(A_u)$	$A_u$	1	$Q, T$	-	-	$z$
11	$\mathbb{G}_2(A_u)$	$A_u$	2	$G, M$	-	-	$-\frac{x^2}{2} - \frac{y^2}{2} + z^2$
12	$\mathbb{Q}_3(A_u, 1)$	$A_u$	3	$Q, T$	1	-	$-\frac{z(3x^2+3y^2-2z^2)}{2}$
13	$\mathbb{Q}_3(A_u, 2)$	$A_u$	3	$Q, T$	2	-	$\frac{\sqrt{10}y(3x^2-y^2)}{4}$
14	$\mathbb{Q}_3(A_u, 3)$	$A_u$	3	$Q, T$	3	-	$\frac{\sqrt{10}x(x^2-3y^2)}{4}$
15	$\mathbb{G}_4(A_u, 1)$	$A_u$	4	$G, M$	1	-	$\frac{3x^4}{8} + \frac{3x^2y^2}{4} - 3x^2z^2 + \frac{3y^4}{8} - 3y^2z^2 + z^4$
16	$\mathbb{G}_4(A_u, 2)$	$A_u$	4	$G, M$	2	-	$\frac{\sqrt{70}xz(x^2-3y^2)}{4}$
17	$\mathbb{G}_4(A_u, 3)$	$A_u$	4	$G, M$	3	-	$\frac{\sqrt{70}yz(3x^2-y^2)}{4}$
18	$\mathbb{G}_{1,1}(E_g)$	$E_g$	1	$G, M$	-	1	$x$
19	$\mathbb{G}_{1,2}(E_g)$					2	$y$
20	$\mathbb{Q}_{2,1}(E_g, 1)$	$E_g$	2	$Q, T$	1	1	$\sqrt{3}yz$
21	$\mathbb{Q}_{2,2}(E_g, 1)$					2	$-\sqrt{3}xz$
22	$\mathbb{Q}_{2,1}(E_g, 2)$	$E_g$	2	$Q, T$	2	1	$\frac{\sqrt{3}(x-y)(x+y)}{2}$
23	$\mathbb{Q}_{2,2}(E_g, 2)$					2	$-\sqrt{3}xy$
24	$\mathbb{G}_{3,1}(E_g, 1)$	$E_g$	3	$G, M$	1	1	$-\frac{\sqrt{6}x(x^2+y^2-4z^2)}{4}$
25	$\mathbb{G}_{3,2}(E_g, 1)$					2	$-\frac{\sqrt{6}y(x^2+y^2-4z^2)}{4}$
26	$\mathbb{G}_{3,1}(E_g, 2)$	$E_g$	3	$G, M$	2	1	$\sqrt{15}xyz$
27	$\mathbb{G}_{3,2}(E_g, 2)$					2	$\frac{\sqrt{15}z(x-y)(x+y)}{2}$
28	$\mathbb{Q}_{4,1}(E_g, 1)$	$E_g$	4	$Q, T$	1	1	$-\frac{\sqrt{10}yz(3x^2+3y^2-4z^2)}{4}$
29	$\mathbb{Q}_{4,2}(E_g, 1)$					2	$\frac{\sqrt{10}xz(3x^2+3y^2-4z^2)}{4}$

continued ...

Table 2

#	symbol	irrep.	rank	X	multiplicity	component	symmetry
30	$\mathbb{Q}_{4,1}(E_g, 2)$	$E_g$	4	$Q, T$	2	1	$\frac{\sqrt{35}(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$
31	$\mathbb{Q}_{4,2}(E_g, 2)$					2	$\frac{\sqrt{35}xy(x-y)(x+y)}{2}$
32	$\mathbb{Q}_{4,1}(E_g, 3)$	$E_g$	4	$Q, T$	3	1	$-\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$
33	$\mathbb{Q}_{4,2}(E_g, 3)$					2	$\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$
34	$\mathbb{Q}_{1,1}(E_u)$	$E_u$	1	$Q, T$	-	1	$x$
35	$\mathbb{Q}_{1,2}(E_u)$					2	$y$
36	$\mathbb{G}_{2,1}(E_u, 1)$	$E_u$	2	$G, M$	1	1	$\sqrt{3}yz$
37	$\mathbb{G}_{2,2}(E_u, 1)$					2	$-\sqrt{3}xz$
38	$\mathbb{G}_{2,1}(E_u, 2)$	$E_u$	2	$G, M$	2	1	$\frac{\sqrt{3}(x-y)(x+y)}{2}$
39	$\mathbb{G}_{2,2}(E_u, 2)$					2	$-\sqrt{3}xy$
40	$\mathbb{Q}_{3,1}(E_u, 1)$	$E_u$	3	$Q, T$	1	1	$-\frac{\sqrt{6}x(x^2+y^2-4z^2)}{4}$
41	$\mathbb{Q}_{3,2}(E_u, 1)$					2	$-\frac{\sqrt{6}y(x^2+y^2-4z^2)}{4}$
42	$\mathbb{Q}_{3,1}(E_u, 2)$	$E_u$	3	$Q, T$	2	1	$\sqrt{15}xyz$
43	$\mathbb{Q}_{3,2}(E_u, 2)$					2	$\frac{\sqrt{15}z(x-y)(x+y)}{2}$
44	$\mathbb{G}_{4,1}(E_u, 1)$	$E_u$	4	$G, M$	1	1	$-\frac{\sqrt{10}yz(3x^2+3y^2-4z^2)}{4}$
45	$\mathbb{G}_{4,2}(E_u, 1)$					2	$\frac{\sqrt{10}xz(3x^2+3y^2-4z^2)}{4}$
46	$\mathbb{G}_{4,1}(E_u, 2)$	$E_u$	4	$G, M$	2	1	$\frac{\sqrt{35}(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$
47	$\mathbb{G}_{4,2}(E_u, 2)$					2	$\frac{\sqrt{35}xy(x-y)(x+y)}{2}$
48	$\mathbb{G}_{4,1}(E_u, 3)$	$E_u$	4	$G, M$	3	1	$-\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$
49	$\mathbb{G}_{4,2}(E_u, 3)$					2	$\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$

Table 3: dimension = 24

#	orbital@atom(SL)	#	orbital@atom(SL)	#	orbital@atom(SL)	#	orbital@atom(SL)	#	orbital@atom(SL)
0	$ s, \uparrow\rangle @A(1)$	1	$ s, \downarrow\rangle @A(1)$	2	$ p_x, \uparrow\rangle @A(1)$	3	$ p_x, \downarrow\rangle @A(1)$	4	$ p_y, \uparrow\rangle @A(1)$
5	$ p_y, \downarrow\rangle @A(1)$	6	$ p_z, \uparrow\rangle @A(1)$	7	$ p_z, \downarrow\rangle @A(1)$	8	$ s, \uparrow\rangle @A(2)$	9	$ s, \downarrow\rangle @A(2)$
10	$ p_x, \uparrow\rangle @A(2)$	11	$ p_x, \downarrow\rangle @A(2)$	12	$ p_y, \uparrow\rangle @A(2)$	13	$ p_y, \downarrow\rangle @A(2)$	14	$ p_z, \uparrow\rangle @A(2)$
15	$ p_z, \downarrow\rangle @A(2)$	16	$ s, \uparrow\rangle @A(3)$	17	$ s, \downarrow\rangle @A(3)$	18	$ p_x, \uparrow\rangle @A(3)$	19	$ p_x, \downarrow\rangle @A(3)$
20	$ p_y, \uparrow\rangle @A(3)$	21	$ p_y, \downarrow\rangle @A(3)$	22	$ p_z, \uparrow\rangle @A(3)$	23	$ p_z, \downarrow\rangle @A(3)$		

Table 4: Atomic basis (orbital part only)

orbital	definition
$ s\rangle$	1
$ p_x\rangle$	$x$
$ p_y\rangle$	$y$
$ p_z\rangle$	$z$

312 (all 468) SAMBs

• 'A' site-cluster

\* bra:  $\langle s, \uparrow |, \langle s, \downarrow |$

\* ket:  $|s, \uparrow\rangle, |s, \downarrow\rangle$

\* wyckoff: **3e**

$$\boxed{\text{z1}} \quad \mathbb{Q}_0^{(c)}(A_g) = \mathbb{Q}_0^{(a)}(A_g)\mathbb{Q}_0^{(s)}(A_g)$$

$$\boxed{\text{z81}} \quad \mathbb{Q}_{2,1}^{(c)}(E_g, 1) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_g)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z82}} \quad \mathbb{Q}_{2,2}^{(c)}(E_g, 1) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_g)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2}$$

• 'A' site-cluster

\* bra:  $\langle s, \uparrow |, \langle s, \downarrow |$

\* ket:  $|p_x, \uparrow\rangle, |p_x, \downarrow\rangle, |p_y, \uparrow\rangle, |p_y, \downarrow\rangle, |p_z, \uparrow\rangle, |p_z, \downarrow\rangle$

\* wyckoff: **3e**

$$\boxed{\text{z241}} \quad \mathbb{Q}_1^{(c)}(A_u, a) = \mathbb{Q}_1^{(a)}(A_u)\mathbb{Q}_0^{(s)}(A_g)$$

$$\boxed{\text{z242}} \quad \mathbb{Q}_1^{(c)}(A_u, b) = -\frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E_u)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E_u)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z243}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_u) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z244}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_u, 2) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z245}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_u, 3) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z246}} \quad \mathbb{Q}_1^{(1,0;c)}(A_u, a) = \mathbb{Q}_1^{(1,0;a)}(A_u)\mathbb{Q}_0^{(s)}(A_g)$$

$$\boxed{\text{z247}} \quad \mathbb{Q}_1^{(1,0;c)}(A_u, b) = -\frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E_u)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E_u)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z248}} \quad \mathbb{G}_2^{(c)}(A_u) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E_u)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E_u)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z249}} \quad \mathbb{G}_0^{(1,-1;c)}(A_u) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z250}} \quad \mathbb{G}_2^{(1,-1;c)}(A_u) = \mathbb{G}_2^{(1,-1;a)}(A_u)\mathbb{Q}_0^{(s)}(A_g)$$

$$\boxed{\text{z251}} \quad \mathbb{G}_2^{(1,0;c)}(A_u) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E_u)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E_u)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z252}} \quad \mathbb{G}_0^{(1,1;c)}(A_u) = \mathbb{G}_0^{(1,1;a)}(A_u)\mathbb{Q}_0^{(s)}(A_g)$$

$$\boxed{\text{z317}} \quad \mathbb{Q}_{1,1}^{(c)}(E_u, a) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E_u)\mathbb{Q}_0^{(s)}(A_g)}{2}$$

$$\boxed{\text{z318}} \quad \mathbb{Q}_{1,2}^{(c)}(E_u, a) = \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E_u)\mathbb{Q}_0^{(s)}(A_g)}{2}$$

$$\boxed{\text{z319}} \quad \mathbb{Q}_{1,1}^{(c)}(E_u, b) = -\frac{\sqrt{2}\mathbb{Q}_1^{(a)}(A_u)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z320}} \quad \mathbb{Q}_{1,2}^{(c)}(E_u, b) = \frac{\sqrt{2}\mathbb{Q}_1^{(a)}(A_u)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z321}} \quad \mathbb{Q}_{3,1}^{(c)}(E_u, 2) = \frac{\mathbb{Q}_{1,1}^{(a)}(E_u)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E_u)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z322}} \quad \mathbb{Q}_{3,2}^{(c)}(E_u, 2) = -\frac{\mathbb{Q}_{1,1}^{(a)}(E_u)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E_u)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z323}} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E_u) = -\frac{\sqrt{10}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{10} + \frac{\sqrt{10}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{10} - \frac{\sqrt{30}\mathbb{G}_2^{(1,-1;a)}(A_u)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{10}$$

$$\boxed{\text{z324}} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E_u) = \frac{\sqrt{10}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{10} + \frac{\sqrt{10}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{10} - \frac{\sqrt{30}\mathbb{G}_2^{(1,-1;a)}(A_u)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{10}$$

$$\boxed{\text{z325}} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E_u, 1) = \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_u)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{5}$$

$$\boxed{\text{z326}} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(Eu, 1) = -\frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{2,2}^{(s)}(Eg, 1)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{2,1}^{(s)}(Eg, 1)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(Au)\mathbb{Q}_{2,2}^{(s)}(Eg, 1)}{5}$$

$$\boxed{\text{z327}} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(Eu, a) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(Eu)\mathbb{Q}_0^{(s)}(Ag)}{2}$$

$$\boxed{\text{z328}} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(Eu, a) = \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(Eu)\mathbb{Q}_0^{(s)}(Ag)}{2}$$

$$\boxed{\text{z329}} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(Eu, b) = -\frac{\sqrt{2}\mathbb{Q}_1^{(1,0;a)}(Au)\mathbb{Q}_{2,2}^{(s)}(Eg, 1)}{2}$$

$$\boxed{\text{z330}} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(Eu, b) = \frac{\sqrt{2}\mathbb{Q}_1^{(1,0;a)}(Au)\mathbb{Q}_{2,1}^{(s)}(Eg, 1)}{2}$$

$$\boxed{\text{z331}} \quad \mathbb{Q}_{3,1}^{(1,0;c)}(Eu, 2) = \frac{\mathbb{Q}_{1,1}^{(1,0;a)}(Eu)\mathbb{Q}_{2,1}^{(s)}(Eg, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(Eu)\mathbb{Q}_{2,2}^{(s)}(Eg, 1)}{2}$$

$$\boxed{\text{z332}} \quad \mathbb{Q}_{3,2}^{(1,0;c)}(Eu, 2) = -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(Eu)\mathbb{Q}_{2,2}^{(s)}(Eg, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(Eu)\mathbb{Q}_{2,1}^{(s)}(Eg, 1)}{2}$$

$$\boxed{\text{z333}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(Eu, 1) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 1)\mathbb{Q}_0^{(s)}(Ag)}{2}$$

$$\boxed{\text{z334}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(Eu, 1) = \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 1)\mathbb{Q}_0^{(s)}(Ag)}{2}$$

$$\boxed{\text{z335}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(Eu, 2a) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_0^{(s)}(Ag)}{2}$$

$$\boxed{\text{z336}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(Eu, 2a) = \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_0^{(s)}(Ag)}{2}$$

$$\boxed{\text{z337}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(Eu, 2b) = -\frac{\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 1)\mathbb{Q}_{2,1}^{(s)}(Eg, 1)}{2} + \frac{\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 1)\mathbb{Q}_{2,2}^{(s)}(Eg, 1)}{2}$$

$$\boxed{\text{z338}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(Eu, 2b) = \frac{\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 1)\mathbb{Q}_{2,2}^{(s)}(Eg, 1)}{2} + \frac{\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 1)\mathbb{Q}_{2,1}^{(s)}(Eg, 1)}{2}$$

$$\boxed{\text{z339}} \quad \mathbb{G}_{2,1}^{(1,1;c)}(Eu, 1) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(Au)\mathbb{Q}_{2,1}^{(s)}(Eg, 1)}{2}$$



$$\boxed{\text{z340}} \quad \mathbb{G}_{2,2}^{(1,1;c)}(E_u, 1) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_u)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2}$$

• 'A' site-cluster

\* bra:  $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$

\* ket:  $|p_x, \uparrow\rangle, |p_x, \downarrow\rangle, |p_y, \uparrow\rangle, |p_y, \downarrow\rangle, |p_z, \uparrow\rangle, |p_z, \downarrow\rangle$

\* wyckoff: **3e**

$$\boxed{\text{z2}} \quad \mathbb{Q}_0^{(c)}(A_g, a) = \mathbb{Q}_0^{(a)}(A_g)\mathbb{Q}_0^{(s)}(A_g)$$

$$\boxed{\text{z3}} \quad \mathbb{Q}_0^{(c)}(A_g, b) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E_g, 1)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E_g, 1)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z4}} \quad \mathbb{Q}_2^{(c)}(A_g) = \mathbb{Q}_2^{(a)}(A_g)\mathbb{Q}_0^{(s)}(A_g)$$

$$\boxed{\text{z5}} \quad \mathbb{Q}_4^{(c)}(A_g, 2) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z6}} \quad \mathbb{Q}_4^{(c)}(A_g, 3) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z7}} \quad \mathbb{Q}_0^{(1,-1;c)}(A_g) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z8}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_g) = \mathbb{Q}_2^{(1,-1;a)}(A_g)\mathbb{Q}_0^{(s)}(A_g)$$

$$\boxed{\text{z9}} \quad \mathbb{Q}_4^{(1,-1;c)}(A_g, 2) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z10}} \quad \mathbb{Q}_4^{(1,-1;c)}(A_g, 3) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z11}} \quad \mathbb{Q}_2^{(1,0;c)}(A_g) = \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E_g)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E_g)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z12}} \quad \mathbb{Q}_0^{(1,1;c)}(A_g) = \mathbb{Q}_0^{(1,1;a)}(A_g)\mathbb{Q}_0^{(s)}(A_g)$$

$$\boxed{\text{z13}} \quad \mathbb{G}_1^{(c)}(A_g) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E_g, 1)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E_g, 1)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z14}} \quad \mathbb{G}_1^{(1,-1;c)}(A_g) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z15}} \quad \mathbb{G}_1^{(1,0;c)}(A_g, a) = \mathbb{G}_1^{(1,0;a)}(A_g)\mathbb{Q}_0^{(s)}(A_g)$$

$$\boxed{\text{z16}} \quad \mathbb{G}_1^{(1,0;c)}(A_g, b) = -\frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E_g)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E_g)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z83}} \quad \mathbb{Q}_{2,1}^{(c)}(E_g, 1a) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_g)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z84}} \quad \mathbb{Q}_{2,2}^{(c)}(E_g, 1a) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_g)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z85}} \quad \mathbb{Q}_{2,1}^{(c)}(E_g, 1b) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E_g, 1)\mathbb{Q}_0^{(s)}(A_g)}{2}$$

$$\boxed{\text{z86}} \quad \mathbb{Q}_{2,2}^{(c)}(E_g, 1b) = \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E_g, 1)\mathbb{Q}_0^{(s)}(A_g)}{2}$$

$$\boxed{\text{z87}} \quad \mathbb{Q}_{2,1}^{(c)}(E_g, 1c) = -\frac{\sqrt{42}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(a)}(A_g)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{14}$$

$$\boxed{\text{z88}} \quad \mathbb{Q}_{2,2}^{(c)}(E_g, 1c) = \frac{\sqrt{42}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(a)}(A_g)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{14}$$

$$\boxed{\text{z89}} \quad \mathbb{Q}_{2,1}^{(c)}(E_g, 2a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_0^{(s)}(A_g)}{2}$$

$$\boxed{\text{z90}} \quad \mathbb{Q}_{2,2}^{(c)}(E_g, 2a) = \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_0^{(s)}(A_g)}{2}$$

$$\boxed{\text{z91}} \quad \mathbb{Q}_{2,1}^{(c)}(E_g, 2b) = -\frac{\mathbb{Q}_{2,1}^{(a)}(E_g, 1)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(a)}(E_g, 1)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z92}} \quad \mathbb{Q}_{2,2}^{(c)}(E_g, 2b) = \frac{\mathbb{Q}_{2,1}^{(a)}(E_g, 1)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(a)}(E_g, 1)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2}$$

$$\boxed{\text{z93}} \quad \mathbb{Q}_{4,1}^{(c)}(E_g, 1) = \frac{\sqrt{7}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_g)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{7}$$

$$\begin{aligned}
\boxed{\text{z94}} \quad \mathbb{Q}_{4,2}^{(c)}(E_g, 1) &= -\frac{\sqrt{7}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_g)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{7} \\
\boxed{\text{z95}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E_g, 1a) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_0^{(s)}(A_g)}{2} \\
\boxed{\text{z96}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E_g, 1a) &= \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_0^{(s)}(A_g)}{2} \\
\boxed{\text{z97}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E_g, 1b) &= -\frac{\sqrt{42}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(1,-1;a)}(A_g)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{14} \\
\boxed{\text{z98}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E_g, 1b) &= \frac{\sqrt{42}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(1,-1;a)}(A_g)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{14} \\
\boxed{\text{z99}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E_g, 2a) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_0^{(s)}(A_g)}{2} \\
\boxed{\text{z100}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E_g, 2a) &= \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_0^{(s)}(A_g)}{2} \\
\boxed{\text{z101}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E_g, 2b) &= -\frac{\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2} \\
\boxed{\text{z102}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E_g, 2b) &= \frac{\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2} \\
\boxed{\text{z103}} \quad \mathbb{Q}_{4,1}^{(1,-1;c)}(E_g, 1) &= \frac{\sqrt{7}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_g)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{7} \\
\boxed{\text{z104}} \quad \mathbb{Q}_{4,2}^{(1,-1;c)}(E_g, 1) &= -\frac{\sqrt{7}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_g)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{7} \\
\boxed{\text{z105}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E_g, 1) &= -\frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(A_g)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2} \\
\boxed{\text{z106}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E_g, 1) &= \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(A_g)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2} \\
\boxed{\text{z107}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E_g, 2) &= \frac{\mathbb{G}_{1,1}^{(1,0;a)}(E_g)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E_g)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2}
\end{aligned}$$

$$\text{z108} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E_g, 2) = -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E_g)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E_g)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2}$$

$$\text{z109} \quad \mathbb{Q}_{2,1}^{(1,1;c)}(E_g, 1) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_g)\mathbb{Q}_{2,1}^{(s)}(E_g, 1)}{2}$$

$$\text{z110} \quad \mathbb{Q}_{2,2}^{(1,1;c)}(E_g, 1) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_g)\mathbb{Q}_{2,2}^{(s)}(E_g, 1)}{2}$$

$$\text{z111} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E_g) = \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E_g)\mathbb{Q}_0^{(s)}(A_g)}{2}$$

$$\text{z112} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E_g) = \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E_g)\mathbb{Q}_0^{(s)}(A_g)}{2}$$

• 'A'-'A' bond-cluster

\* bra:  $\langle s, \uparrow |, \langle s, \downarrow |$

\* ket:  $|s, \uparrow\rangle, |s, \downarrow\rangle$

\* wyckoff: **6a@6g**

$$\text{z17} \quad \mathbb{Q}_0^{(c)}(A_g) = \mathbb{Q}_0^{(a)}(A_g)\mathbb{Q}_0^{(b)}(A_g)$$

$$\text{z18} \quad \mathbb{Q}_0^{(1,-1;c)}(A_g) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} + \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{2}$$

$$\text{z19} \quad \mathbb{G}_1^{(1,-1;c)}(A_g, a) = \mathbb{M}_1^{(1,-1;a)}(A_g)\mathbb{T}_0^{(b)}(A_g)$$

$$\text{z20} \quad \mathbb{G}_1^{(1,-1;c)}(A_g, b) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{2}$$

$$\text{z113} \quad \mathbb{Q}_1^{(c)}(A_u) = \mathbb{Q}_0^{(a)}(A_g)\mathbb{Q}_1^{(b)}(A_u)$$

$$\text{z114} \quad \mathbb{Q}_1^{(1,-1;c)}(A_u) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{T}_{1,2}^{(b)}(E_u)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{T}_{1,1}^{(b)}(E_u)}{2}$$

$$\text{z115} \quad \mathbb{G}_0^{(1,-1;c)}(A_u) = \frac{\sqrt{3}\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{T}_{1,1}^{(b)}(E_u)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{T}_{1,2}^{(b)}(E_u)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(1,-1;a)}(A_g)\mathbb{T}_1^{(b)}(A_u)}{3}$$

$$\text{z116} \quad \mathbb{G}_2^{(1,-1;c)}(A_u) = -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{T}_{1,1}^{(b)}(E_u)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{T}_{1,2}^{(b)}(E_u)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(1,-1;a)}(A_g)\mathbb{T}_1^{(b)}(A_u)}{3}$$

$$\boxed{\text{z117}} \quad \mathbb{Q}_{2,1}^{(c)}(E_g, 1) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_g)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2}$$

$$\boxed{\text{z118}} \quad \mathbb{Q}_{2,2}^{(c)}(E_g, 1) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_g)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2}$$

$$\boxed{\text{z119}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E_g, 1) = \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(A_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z120}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E_g, 1) = -\frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(A_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z253}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E_g, 2) = \frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z254}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E_g, 2) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z255}} \quad \mathbb{G}_{1,1}^{(1,-1;c)}(E_g) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{T}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z256}} \quad \mathbb{G}_{1,2}^{(1,-1;c)}(E_g) = \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{T}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z341}} \quad \mathbb{Q}_{1,1}^{(c)}(E_u) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_g)\mathbb{Q}_{1,1}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z342}} \quad \mathbb{Q}_{1,2}^{(c)}(E_u) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_g)\mathbb{Q}_{1,2}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z343}} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E_u) = \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{T}_1^{(b)}(A_u)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(A_g)\mathbb{T}_{1,2}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z344}} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E_u) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{T}_1^{(b)}(A_u)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(A_g)\mathbb{T}_{1,1}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z345}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E_u, 1) = \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{T}_1^{(b)}(A_u)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(A_g)\mathbb{T}_{1,2}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z346}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E_u, 1) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{T}_1^{(b)}(A_u)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(A_g)\mathbb{T}_{1,1}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z347}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(Eu, 2) = \frac{\mathbb{M}_{1,1}^{(1,-1;a)}(Eu)\mathbb{T}_{1,1}^{(b)}(Eu)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(Eu)\mathbb{T}_{1,2}^{(b)}(Eu)}{2}$$

$$\boxed{\text{z348}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(Eu, 2) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(Eu)\mathbb{T}_{1,2}^{(b)}(Eu)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(Eu)\mathbb{T}_{1,1}^{(b)}(Eu)}{2}$$

• 'A'-'A' bond-cluster

\* bra:  $\langle s, \uparrow |, \langle s, \downarrow |$

\* ket:  $|p_x, \uparrow\rangle, |p_x, \downarrow\rangle, |p_y, \uparrow\rangle, |p_y, \downarrow\rangle, |p_z, \uparrow\rangle, |p_z, \downarrow\rangle$

\* wyckoff: **6a06g**

$$\boxed{\text{z21}} \quad \mathbb{Q}_0^{(c)}(Ag, a) = \frac{\sqrt{3}\mathbb{Q}_{1,1}^{(a)}(Eu)\mathbb{Q}_{1,1}^{(b)}(Eu)}{3} + \frac{\sqrt{3}\mathbb{Q}_{1,2}^{(a)}(Eu)\mathbb{Q}_{1,2}^{(b)}(Eu)}{3} + \frac{\sqrt{3}\mathbb{Q}_1^{(a)}(Au)\mathbb{Q}_1^{(b)}(Au)}{3}$$

$$\boxed{\text{z22}} \quad \mathbb{Q}_0^{(c)}(Ag, b) = \frac{\sqrt{3}\mathbb{T}_{1,1}^{(a)}(Eu)\mathbb{T}_{1,1}^{(b)}(Eu)}{3} + \frac{\sqrt{3}\mathbb{T}_{1,2}^{(a)}(Eu)\mathbb{T}_{1,2}^{(b)}(Eu)}{3} + \frac{\sqrt{3}\mathbb{T}_1^{(a)}(Au)\mathbb{T}_1^{(b)}(Au)}{3}$$

$$\boxed{\text{z23}} \quad \mathbb{Q}_2^{(c)}(Ag, a) = -\frac{\sqrt{6}\mathbb{Q}_{1,1}^{(a)}(Eu)\mathbb{Q}_{1,1}^{(b)}(Eu)}{6} - \frac{\sqrt{6}\mathbb{Q}_{1,2}^{(a)}(Eu)\mathbb{Q}_{1,2}^{(b)}(Eu)}{6} + \frac{\sqrt{6}\mathbb{Q}_1^{(a)}(Au)\mathbb{Q}_1^{(b)}(Au)}{3}$$

$$\boxed{\text{z24}} \quad \mathbb{Q}_2^{(c)}(Ag, b) = -\frac{\sqrt{6}\mathbb{T}_{1,1}^{(a)}(Eu)\mathbb{T}_{1,1}^{(b)}(Eu)}{6} - \frac{\sqrt{6}\mathbb{T}_{1,2}^{(a)}(Eu)\mathbb{T}_{1,2}^{(b)}(Eu)}{6} + \frac{\sqrt{6}\mathbb{T}_1^{(a)}(Au)\mathbb{T}_1^{(b)}(Au)}{3}$$

$$\boxed{\text{z25}} \quad \mathbb{Q}_2^{(1,-1;c)}(Ag, a) = -\frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 1)\mathbb{Q}_{1,1}^{(b)}(Eu)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 1)\mathbb{Q}_{1,2}^{(b)}(Eu)}{2}$$

$$\boxed{\text{z26}} \quad \mathbb{Q}_2^{(1,-1;c)}(Ag, b) = -\frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(Eu, 1)\mathbb{T}_{1,1}^{(b)}(Eu)}{2} - \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(Eu, 1)\mathbb{T}_{1,2}^{(b)}(Eu)}{2}$$

$$\boxed{\text{z27}} \quad \mathbb{Q}_0^{(1,0;c)}(Ag, a) = \frac{\sqrt{3}\mathbb{Q}_{1,1}^{(1,0;a)}(Eu)\mathbb{Q}_{1,1}^{(b)}(Eu)}{3} + \frac{\sqrt{3}\mathbb{Q}_{1,2}^{(1,0;a)}(Eu)\mathbb{Q}_{1,2}^{(b)}(Eu)}{3} + \frac{\sqrt{3}\mathbb{Q}_1^{(1,0;a)}(Au)\mathbb{Q}_1^{(b)}(Au)}{3}$$

$$\boxed{\text{z28}} \quad \mathbb{Q}_0^{(1,0;c)}(Ag, b) = \frac{\sqrt{3}\mathbb{T}_{1,1}^{(1,0;a)}(Eu)\mathbb{T}_{1,1}^{(b)}(Eu)}{3} + \frac{\sqrt{3}\mathbb{T}_{1,2}^{(1,0;a)}(Eu)\mathbb{T}_{1,2}^{(b)}(Eu)}{3} + \frac{\sqrt{3}\mathbb{T}_1^{(1,0;a)}(Au)\mathbb{T}_1^{(b)}(Au)}{3}$$

$$\boxed{\text{z29}} \quad \mathbb{Q}_2^{(1,0;c)}(Ag, a) = -\frac{\sqrt{6}\mathbb{Q}_{1,1}^{(1,0;a)}(Eu)\mathbb{Q}_{1,1}^{(b)}(Eu)}{6} - \frac{\sqrt{6}\mathbb{Q}_{1,2}^{(1,0;a)}(Eu)\mathbb{Q}_{1,2}^{(b)}(Eu)}{6} + \frac{\sqrt{6}\mathbb{Q}_1^{(1,0;a)}(Au)\mathbb{Q}_1^{(b)}(Au)}{3}$$

$$\boxed{\text{z30}} \quad \mathbb{Q}_2^{(1,0;c)}(Ag, b) = -\frac{\sqrt{6}\mathbb{T}_{1,1}^{(1,0;a)}(Eu)\mathbb{T}_{1,1}^{(b)}(Eu)}{6} - \frac{\sqrt{6}\mathbb{T}_{1,2}^{(1,0;a)}(Eu)\mathbb{T}_{1,2}^{(b)}(Eu)}{6} + \frac{\sqrt{6}\mathbb{T}_1^{(1,0;a)}(Au)\mathbb{T}_1^{(b)}(Au)}{3}$$

$$\begin{aligned}
\boxed{\text{z31}} \quad \mathbb{G}_1^{(c)}(A_g, a) &= \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E_u)\mathbb{Q}_{1,2}^{(b)}(E_u)}{2} - \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E_u)\mathbb{Q}_{1,1}^{(b)}(E_u)}{2} \\
\boxed{\text{z32}} \quad \mathbb{G}_1^{(c)}(A_g, b) &= \frac{\sqrt{2}\mathbb{T}_{1,1}^{(a)}(E_u)\mathbb{T}_{1,2}^{(b)}(E_u)}{2} - \frac{\sqrt{2}\mathbb{T}_{1,2}^{(a)}(E_u)\mathbb{T}_{1,1}^{(b)}(E_u)}{2} \\
\boxed{\text{z33}} \quad \mathbb{G}_1^{(1,-1;c)}(A_g, a) &= \frac{\sqrt{30}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{1,2}^{(b)}(E_u)}{10} - \frac{\sqrt{30}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{1,1}^{(b)}(E_u)}{10} + \frac{\sqrt{10}\mathbb{G}_2^{(1,-1;a)}(A_u)\mathbb{Q}_1^{(b)}(A_u)}{5} \\
\boxed{\text{z34}} \quad \mathbb{G}_1^{(1,-1;c)}(A_g, b) &= \frac{\sqrt{30}\mathbb{M}_{2,1}^{(1,-1;a)}(E_u, 1)\mathbb{T}_{1,2}^{(b)}(E_u)}{10} - \frac{\sqrt{30}\mathbb{M}_{2,2}^{(1,-1;a)}(E_u, 1)\mathbb{T}_{1,1}^{(b)}(E_u)}{10} + \frac{\sqrt{10}\mathbb{M}_2^{(1,-1;a)}(A_u)\mathbb{T}_1^{(b)}(A_u)}{5} \\
\boxed{\text{z35}} \quad \mathbb{G}_3^{(1,-1;c)}(A_g, 1a) &= -\frac{\sqrt{5}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{1,2}^{(b)}(E_u)}{5} + \frac{\sqrt{5}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{1,1}^{(b)}(E_u)}{5} + \frac{\sqrt{15}\mathbb{G}_2^{(1,-1;a)}(A_u)\mathbb{Q}_1^{(b)}(A_u)}{5} \\
\boxed{\text{z36}} \quad \mathbb{G}_3^{(1,-1;c)}(A_g, 1b) &= -\frac{\sqrt{5}\mathbb{M}_{2,1}^{(1,-1;a)}(E_u, 1)\mathbb{T}_{1,2}^{(b)}(E_u)}{5} + \frac{\sqrt{5}\mathbb{M}_{2,2}^{(1,-1;a)}(E_u, 1)\mathbb{T}_{1,1}^{(b)}(E_u)}{5} + \frac{\sqrt{15}\mathbb{M}_2^{(1,-1;a)}(A_u)\mathbb{T}_1^{(b)}(A_u)}{5} \\
\boxed{\text{z37}} \quad \mathbb{G}_3^{(1,-1;c)}(A_g, 2a) &= \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_{1,2}^{(b)}(E_u)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_{1,1}^{(b)}(E_u)}{2} \\
\boxed{\text{z38}} \quad \mathbb{G}_3^{(1,-1;c)}(A_g, 2b) &= \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E_u, 2)\mathbb{T}_{1,2}^{(b)}(E_u)}{2} - \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E_u, 2)\mathbb{T}_{1,1}^{(b)}(E_u)}{2} \\
\boxed{\text{z39}} \quad \mathbb{G}_3^{(1,-1;c)}(A_g, 3a) &= \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_{1,1}^{(b)}(E_u)}{2} + \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_{1,2}^{(b)}(E_u)}{2} \\
\boxed{\text{z40}} \quad \mathbb{G}_3^{(1,-1;c)}(A_g, 3b) &= \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E_u, 2)\mathbb{T}_{1,1}^{(b)}(E_u)}{2} + \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E_u, 2)\mathbb{T}_{1,2}^{(b)}(E_u)}{2} \\
\boxed{\text{z41}} \quad \mathbb{G}_1^{(1,0;c)}(A_g, a) &= \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E_u)\mathbb{Q}_{1,2}^{(b)}(E_u)}{2} - \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E_u)\mathbb{Q}_{1,1}^{(b)}(E_u)}{2} \\
\boxed{\text{z42}} \quad \mathbb{G}_1^{(1,0;c)}(A_g, b) &= \frac{\sqrt{2}\mathbb{T}_{1,1}^{(1,0;a)}(E_u)\mathbb{T}_{1,2}^{(b)}(E_u)}{2} - \frac{\sqrt{2}\mathbb{T}_{1,2}^{(1,0;a)}(E_u)\mathbb{T}_{1,1}^{(b)}(E_u)}{2} \\
\boxed{\text{z43}} \quad \mathbb{G}_1^{(1,1;c)}(A_g, a) &= \mathbb{G}_0^{(1,1;a)}(A_u)\mathbb{Q}_1^{(b)}(A_u) \\
\boxed{\text{z44}} \quad \mathbb{G}_1^{(1,1;c)}(A_g, b) &= \mathbb{M}_0^{(1,1;a)}(A_u)\mathbb{T}_1^{(b)}(A_u)
\end{aligned}$$

$$\boxed{\text{z121}} \quad \mathbb{Q}_1^{(c)}(A_u, a) = \mathbb{Q}_1^{(a)}(A_u) \mathbb{Q}_0^{(b)}(A_g)$$

$$\boxed{\text{z122}} \quad \mathbb{Q}_1^{(c)}(A_u, b) = -\frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E_u)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E_u)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2}$$

$$\boxed{\text{z123}} \quad \mathbb{Q}_1^{(c)}(A_u, c) = \mathbb{T}_1^{(a)}(A_u) \mathbb{T}_0^{(b)}(A_g)$$

$$\boxed{\text{z124}} \quad \mathbb{Q}_1^{(c)}(A_u, d) = \frac{\sqrt{2}\mathbb{T}_{1,1}^{(a)}(E_u)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} - \frac{\sqrt{2}\mathbb{T}_{1,2}^{(a)}(E_u)\mathbb{M}_{1,1}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z125}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_u, a) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2}$$

$$\boxed{\text{z126}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_u, b) = \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E_u, 1)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} - \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E_u, 1)\mathbb{M}_{1,1}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z127}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_u, 2a) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2}$$

$$\boxed{\text{z128}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_u, 2b) = \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E_u, 2)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} - \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E_u, 2)\mathbb{M}_{1,1}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z129}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_u, 3a) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2}$$

$$\boxed{\text{z130}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_u, 3b) = \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E_u, 2)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} + \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E_u, 2)\mathbb{M}_{1,2}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z131}} \quad \mathbb{Q}_1^{(1,0;c)}(A_u, a) = \mathbb{Q}_1^{(1,0;a)}(A_u) \mathbb{Q}_0^{(b)}(A_g)$$

$$\boxed{\text{z132}} \quad \mathbb{Q}_1^{(1,0;c)}(A_u, b) = -\frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E_u)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E_u)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2}$$

$$\boxed{\text{z133}} \quad \mathbb{Q}_1^{(1,0;c)}(A_u, c) = \mathbb{T}_1^{(1,0;a)}(A_u) \mathbb{T}_0^{(b)}(A_g)$$

$$\boxed{\text{z134}} \quad \mathbb{Q}_1^{(1,0;c)}(A_u, d) = \frac{\sqrt{2}\mathbb{T}_{1,1}^{(1,0;a)}(E_u)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} - \frac{\sqrt{2}\mathbb{T}_{1,2}^{(1,0;a)}(E_u)\mathbb{M}_{1,1}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z135}} \quad \mathbb{G}_0^{(c)}(A_u) = \frac{\sqrt{2}\mathbb{T}_{1,1}^{(a)}(E_u)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} + \frac{\sqrt{2}\mathbb{T}_{1,2}^{(a)}(E_u)\mathbb{M}_{1,2}^{(b)}(E_g)}{2}$$



$$\begin{aligned}
\text{z136} \quad \mathbb{G}_2^{(c)}(A_u) &= \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E_u)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E_u)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} \\
\text{z137} \quad \mathbb{G}_0^{(1,-1;c)}(A_u) &= \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} \\
\text{z138} \quad \mathbb{G}_2^{(1,-1;c)}(A_u, a) &= \mathbb{G}_2^{(1,-1;a)}(A_u)\mathbb{Q}_0^{(b)}(A_g) \\
\text{z139} \quad \mathbb{G}_2^{(1,-1;c)}(A_u, b) &= \mathbb{M}_2^{(1,-1;a)}(A_u)\mathbb{T}_0^{(b)}(A_g) \\
\text{z140} \quad \mathbb{G}_2^{(1,-1;c)}(A_u, c) &= -\frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E_u, 1)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} - \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E_u, 1)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} \\
\text{z141} \quad \mathbb{G}_0^{(1,0;c)}(A_u) &= \frac{\sqrt{2}\mathbb{T}_{1,1}^{(1,0;a)}(E_u)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} + \frac{\sqrt{2}\mathbb{T}_{1,2}^{(1,0;a)}(E_u)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} \\
\text{z142} \quad \mathbb{G}_2^{(1,0;c)}(A_u) &= \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E_u)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E_u)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} \\
\text{z143} \quad \mathbb{G}_0^{(1,1;c)}(A_u, a) &= \mathbb{G}_0^{(1,1;a)}(A_u)\mathbb{Q}_0^{(b)}(A_g) \\
\text{z144} \quad \mathbb{G}_0^{(1,1;c)}(A_u, b) &= \mathbb{M}_0^{(1,1;a)}(A_u)\mathbb{T}_0^{(b)}(A_g) \\
\text{z145} \quad \mathbb{Q}_{2,1}^{(c)}(E_g, 1a) &= \frac{\mathbb{Q}_{1,2}^{(a)}(E_u)\mathbb{Q}_1^{(b)}(A_u)}{2} + \frac{\mathbb{Q}_1^{(a)}(A_u)\mathbb{Q}_{1,2}^{(b)}(E_u)}{2} \\
\text{z146} \quad \mathbb{Q}_{2,2}^{(c)}(E_g, 1a) &= -\frac{\mathbb{Q}_{1,1}^{(a)}(E_u)\mathbb{Q}_1^{(b)}(A_u)}{2} - \frac{\mathbb{Q}_1^{(a)}(A_u)\mathbb{Q}_{1,1}^{(b)}(E_u)}{2} \\
\text{z147} \quad \mathbb{Q}_{2,1}^{(c)}(E_g, 1b) &= \frac{\mathbb{T}_{1,2}^{(a)}(E_u)\mathbb{T}_1^{(b)}(A_u)}{2} + \frac{\mathbb{T}_1^{(a)}(A_u)\mathbb{T}_{1,2}^{(b)}(E_u)}{2} \\
\text{z148} \quad \mathbb{Q}_{2,2}^{(c)}(E_g, 1b) &= -\frac{\mathbb{T}_{1,1}^{(a)}(E_u)\mathbb{T}_1^{(b)}(A_u)}{2} - \frac{\mathbb{T}_1^{(a)}(A_u)\mathbb{T}_{1,1}^{(b)}(E_u)}{2} \\
\text{z149} \quad \mathbb{Q}_{2,1}^{(c)}(E_g, 2a) &= \frac{\mathbb{Q}_{1,1}^{(a)}(E_u)\mathbb{Q}_{1,1}^{(b)}(E_u)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E_u)\mathbb{Q}_{1,2}^{(b)}(E_u)}{2} \\
\text{z150} \quad \mathbb{Q}_{2,2}^{(c)}(E_g, 2a) &= -\frac{\mathbb{Q}_{1,1}^{(a)}(E_u)\mathbb{Q}_{1,2}^{(b)}(E_u)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E_u)\mathbb{Q}_{1,1}^{(b)}(E_u)}{2}
\end{aligned}$$

$$\begin{aligned}
\text{z151} \quad \mathbb{Q}_{2,1}^{(c)}(E_g, 2b) &= \frac{\mathbb{T}_{1,1}^{(a)}(Eu)\mathbb{T}_{1,1}^{(b)}(Eu)}{2} - \frac{\mathbb{T}_{1,2}^{(a)}(Eu)\mathbb{T}_{1,2}^{(b)}(Eu)}{2} \\
\text{z152} \quad \mathbb{Q}_{2,2}^{(c)}(E_g, 2b) &= -\frac{\mathbb{T}_{1,1}^{(a)}(Eu)\mathbb{T}_{1,2}^{(b)}(Eu)}{2} - \frac{\mathbb{T}_{1,2}^{(a)}(Eu)\mathbb{T}_{1,1}^{(b)}(Eu)}{2} \\
\text{z153} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E_g, 1a) &= \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{1,1}^{(b)}(Eu)}{6} + \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 1)\mathbb{Q}_1^{(b)}(Au)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{1,2}^{(b)}(Eu)}{6} + \frac{\mathbb{G}_2^{(1,-1;a)}(Au)\mathbb{Q}_{1,1}^{(b)}(Eu)}{2} \\
\text{z154} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E_g, 1a) &= -\frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 1)\mathbb{Q}_1^{(b)}(Au)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{1,2}^{(b)}(Eu)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{1,1}^{(b)}(Eu)}{6} + \frac{\mathbb{G}_2^{(1,-1;a)}(Au)\mathbb{Q}_{1,2}^{(b)}(Eu)}{2} \\
\text{z155} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E_g, 1b) &= \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{T}_{1,1}^{(b)}(Eu)}{6} + \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(Eu, 1)\mathbb{T}_1^{(b)}(Au)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{T}_{1,2}^{(b)}(Eu)}{6} + \frac{\mathbb{M}_2^{(1,-1;a)}(Au)\mathbb{T}_{1,1}^{(b)}(Eu)}{2} \\
\text{z156} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E_g, 1b) &= -\frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(Eu, 1)\mathbb{T}_1^{(b)}(Au)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{T}_{1,2}^{(b)}(Eu)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{T}_{1,1}^{(b)}(Eu)}{6} + \frac{\mathbb{M}_2^{(1,-1;a)}(Au)\mathbb{T}_{1,2}^{(b)}(Eu)}{2} \\
\text{z157} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E_g, 2a) &= -\frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 1)\mathbb{Q}_{1,1}^{(b)}(Eu)}{6} + \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 1)\mathbb{Q}_{1,2}^{(b)}(Eu)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_1^{(b)}(Au)}{3} \\
\text{z158} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E_g, 2a) &= \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 1)\mathbb{Q}_{1,2}^{(b)}(Eu)}{6} + \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_1^{(b)}(Au)}{3} + \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 1)\mathbb{Q}_{1,1}^{(b)}(Eu)}{6} \\
\text{z159} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E_g, 2b) &= -\frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(Eu, 1)\mathbb{T}_{1,1}^{(b)}(Eu)}{6} + \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(Eu, 1)\mathbb{T}_{1,2}^{(b)}(Eu)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{T}_1^{(b)}(Au)}{3} \\
\text{z160} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E_g, 2b) &= \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(Eu, 1)\mathbb{T}_{1,2}^{(b)}(Eu)}{6} + \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{T}_1^{(b)}(Au)}{3} + \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(Eu, 1)\mathbb{T}_{1,1}^{(b)}(Eu)}{6} \\
\text{z161} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E_g, 1a) &= \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(Eu)\mathbb{Q}_1^{(b)}(Au)}{2} + \frac{\mathbb{Q}_1^{(1,0;a)}(Au)\mathbb{Q}_{1,2}^{(b)}(Eu)}{2} \\
\text{z162} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E_g, 1a) &= -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(Eu)\mathbb{Q}_1^{(b)}(Au)}{2} - \frac{\mathbb{Q}_1^{(1,0;a)}(Au)\mathbb{Q}_{1,1}^{(b)}(Eu)}{2} \\
\text{z163} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E_g, 1b) &= \frac{\mathbb{T}_{1,2}^{(1,0;a)}(Eu)\mathbb{T}_1^{(b)}(Au)}{2} + \frac{\mathbb{T}_1^{(1,0;a)}(Au)\mathbb{T}_{1,2}^{(b)}(Eu)}{2} \\
\text{z164} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E_g, 1b) &= -\frac{\mathbb{T}_{1,1}^{(1,0;a)}(Eu)\mathbb{T}_1^{(b)}(Au)}{2} - \frac{\mathbb{T}_1^{(1,0;a)}(Au)\mathbb{T}_{1,1}^{(b)}(Eu)}{2}
\end{aligned}$$

$$\boxed{\text{z165}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E_g, 2a) = \frac{\mathbb{Q}_{1,1}^{(1,0;a)}(Eu)\mathbb{Q}_{1,1}^{(b)}(Eu)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(Eu)\mathbb{Q}_{1,2}^{(b)}(Eu)}{2}$$

$$\boxed{\text{z166}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E_g, 2a) = -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(Eu)\mathbb{Q}_{1,2}^{(b)}(Eu)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(Eu)\mathbb{Q}_{1,1}^{(b)}(Eu)}{2}$$

$$\boxed{\text{z167}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E_g, 2b) = \frac{\mathbb{T}_{1,1}^{(1,0;a)}(Eu)\mathbb{T}_{1,1}^{(b)}(Eu)}{2} - \frac{\mathbb{T}_{1,2}^{(1,0;a)}(Eu)\mathbb{T}_{1,2}^{(b)}(Eu)}{2}$$

$$\boxed{\text{z168}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E_g, 2b) = -\frac{\mathbb{T}_{1,1}^{(1,0;a)}(Eu)\mathbb{T}_{1,2}^{(b)}(Eu)}{2} - \frac{\mathbb{T}_{1,2}^{(1,0;a)}(Eu)\mathbb{T}_{1,1}^{(b)}(Eu)}{2}$$

$$\boxed{\text{z257}} \quad \mathbb{G}_{1,1}^{(c)}(E_g, a) = \frac{\mathbb{Q}_{1,2}^{(a)}(Eu)\mathbb{Q}_1^{(b)}(Au)}{2} - \frac{\mathbb{Q}_1^{(a)}(Au)\mathbb{Q}_{1,2}^{(b)}(Eu)}{2}$$

$$\boxed{\text{z258}} \quad \mathbb{G}_{1,2}^{(c)}(E_g, a) = -\frac{\mathbb{Q}_{1,1}^{(a)}(Eu)\mathbb{Q}_1^{(b)}(Au)}{2} + \frac{\mathbb{Q}_1^{(a)}(Au)\mathbb{Q}_{1,1}^{(b)}(Eu)}{2}$$

$$\boxed{\text{z259}} \quad \mathbb{G}_{1,1}^{(c)}(E_g, b) = \frac{\mathbb{T}_{1,2}^{(a)}(Eu)\mathbb{T}_1^{(b)}(Au)}{2} - \frac{\mathbb{T}_1^{(a)}(Au)\mathbb{T}_{1,2}^{(b)}(Eu)}{2}$$

$$\boxed{\text{z260}} \quad \mathbb{G}_{1,2}^{(c)}(E_g, b) = -\frac{\mathbb{T}_{1,1}^{(a)}(Eu)\mathbb{T}_1^{(b)}(Au)}{2} + \frac{\mathbb{T}_1^{(a)}(Au)\mathbb{T}_{1,1}^{(b)}(Eu)}{2}$$

$$\boxed{\text{z261}} \quad \mathbb{G}_{1,1}^{(1,-1;c)}(E_g, a) = \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{1,1}^{(b)}(Eu)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 1)\mathbb{Q}_1^{(b)}(Au)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{1,2}^{(b)}(Eu)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(Au)\mathbb{Q}_{1,1}^{(b)}(Eu)}{10}$$

$$\boxed{\text{z262}} \quad \mathbb{G}_{1,2}^{(1,-1;c)}(E_g, a) = \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 1)\mathbb{Q}_1^{(b)}(Au)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{1,2}^{(b)}(Eu)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{1,1}^{(b)}(Eu)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(Au)\mathbb{Q}_{1,2}^{(b)}(Eu)}{10}$$

$$\boxed{\text{z263}} \quad \mathbb{G}_{1,1}^{(1,-1;c)}(E_g, b) = \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{T}_{1,1}^{(b)}(Eu)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(Eu, 1)\mathbb{T}_1^{(b)}(Au)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{T}_{1,2}^{(b)}(Eu)}{10} - \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(Au)\mathbb{T}_{1,1}^{(b)}(Eu)}{10}$$

$$\boxed{\text{z264}} \quad \mathbb{G}_{1,2}^{(1,-1;c)}(E_g, b) = \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(Eu, 1)\mathbb{T}_1^{(b)}(Au)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{T}_{1,2}^{(b)}(Eu)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{T}_{1,1}^{(b)}(Eu)}{10} - \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(Au)\mathbb{T}_{1,2}^{(b)}(Eu)}{10}$$

$$\boxed{\text{z265}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E_g, 1a) = -\frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{1,1}^{(b)}(Eu)}{30} - \frac{2\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 1)\mathbb{Q}_1^{(b)}(Au)}{15} + \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{1,2}^{(b)}(Eu)}{30} + \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(Au)\mathbb{Q}_{1,1}^{(b)}(Eu)}{5}$$

$$\boxed{\text{z266}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E_g, 1a) = \frac{2\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 1)\mathbb{Q}_1^{(b)}(Au)}{15} + \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{1,2}^{(b)}(Eu)}{30} + \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{1,1}^{(b)}(Eu)}{30} + \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(Au)\mathbb{Q}_{1,2}^{(b)}(Eu)}{5}$$

$$\begin{aligned}
\boxed{\text{z267}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E_g, 1b) &= -\frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E_u, 2)\mathbb{T}_{1,1}^{(b)}(E_u)}{30} - \frac{2\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E_u, 1)\mathbb{T}_1^{(b)}(A_u)}{15} + \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E_u, 2)\mathbb{T}_{1,2}^{(b)}(E_u)}{30} + \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(A_u)\mathbb{T}_{1,1}^{(b)}(E_u)}{5} \\
\boxed{\text{z268}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E_g, 1b) &= \frac{2\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E_u, 1)\mathbb{T}_1^{(b)}(A_u)}{15} + \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E_u, 2)\mathbb{T}_{1,2}^{(b)}(E_u)}{30} + \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E_u, 2)\mathbb{T}_{1,1}^{(b)}(E_u)}{30} + \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(A_u)\mathbb{T}_{1,2}^{(b)}(E_u)}{5} \\
\boxed{\text{z269}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E_g, 2a) &= \frac{\sqrt{6}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{1,1}^{(b)}(E_u)}{6} - \frac{\sqrt{6}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{1,2}^{(b)}(E_u)}{6} - \frac{\sqrt{6}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_1^{(b)}(A_u)}{6} \\
\boxed{\text{z270}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E_g, 2a) &= -\frac{\sqrt{6}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{1,2}^{(b)}(E_u)}{6} + \frac{\sqrt{6}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_1^{(b)}(A_u)}{6} - \frac{\sqrt{6}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{1,1}^{(b)}(E_u)}{6} \\
\boxed{\text{z271}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E_g, 2b) &= \frac{\sqrt{6}\mathbb{M}_{2,1}^{(1,-1;a)}(E_u, 1)\mathbb{T}_{1,1}^{(b)}(E_u)}{6} - \frac{\sqrt{6}\mathbb{M}_{2,2}^{(1,-1;a)}(E_u, 1)\mathbb{T}_{1,2}^{(b)}(E_u)}{6} - \frac{\sqrt{6}\mathbb{M}_{2,2}^{(1,-1;a)}(E_u, 2)\mathbb{T}_1^{(b)}(A_u)}{6} \\
\boxed{\text{z272}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E_g, 2b) &= -\frac{\sqrt{6}\mathbb{M}_{2,1}^{(1,-1;a)}(E_u, 1)\mathbb{T}_{1,2}^{(b)}(E_u)}{6} + \frac{\sqrt{6}\mathbb{M}_{2,1}^{(1,-1;a)}(E_u, 2)\mathbb{T}_1^{(b)}(A_u)}{6} - \frac{\sqrt{6}\mathbb{M}_{2,2}^{(1,-1;a)}(E_u, 1)\mathbb{T}_{1,1}^{(b)}(E_u)}{6} \\
\boxed{\text{z273}} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E_g, a) &= \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E_u)\mathbb{Q}_1^{(b)}(A_u)}{2} - \frac{\mathbb{Q}_1^{(1,0;a)}(A_u)\mathbb{Q}_{1,2}^{(b)}(E_u)}{2} \\
\boxed{\text{z274}} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E_g, a) &= -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E_u)\mathbb{Q}_1^{(b)}(A_u)}{2} + \frac{\mathbb{Q}_1^{(1,0;a)}(A_u)\mathbb{Q}_{1,1}^{(b)}(E_u)}{2} \\
\boxed{\text{z275}} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E_g, b) &= \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E_u)\mathbb{T}_1^{(b)}(A_u)}{2} - \frac{\mathbb{T}_1^{(1,0;a)}(A_u)\mathbb{T}_{1,2}^{(b)}(E_u)}{2} \\
\boxed{\text{z276}} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E_g, b) &= -\frac{\mathbb{T}_{1,1}^{(1,0;a)}(E_u)\mathbb{T}_1^{(b)}(A_u)}{2} + \frac{\mathbb{T}_1^{(1,0;a)}(A_u)\mathbb{T}_{1,1}^{(b)}(E_u)}{2} \\
\boxed{\text{z277}} \quad \mathbb{G}_{1,1}^{(1,1;c)}(E_g, a) &= \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_u)\mathbb{Q}_{1,1}^{(b)}(E_u)}{2} \\
\boxed{\text{z278}} \quad \mathbb{G}_{1,2}^{(1,1;c)}(E_g, a) &= \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_u)\mathbb{Q}_{1,2}^{(b)}(E_u)}{2} \\
\boxed{\text{z279}} \quad \mathbb{G}_{1,1}^{(1,1;c)}(E_g, b) &= \frac{\sqrt{2}\mathbb{M}_0^{(1,1;a)}(A_u)\mathbb{T}_{1,1}^{(b)}(E_u)}{2} \\
\boxed{\text{z280}} \quad \mathbb{G}_{1,2}^{(1,1;c)}(E_g, b) &= \frac{\sqrt{2}\mathbb{M}_0^{(1,1;a)}(A_u)\mathbb{T}_{1,2}^{(b)}(E_u)}{2}
\end{aligned}$$

$$\boxed{\text{z349}} \quad \mathbb{Q}_{1,1}^{(c)}(Eu, a) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(Eu)\mathbb{Q}_0^{(b)}(Ag)}{2}$$

$$\boxed{\text{z350}} \quad \mathbb{Q}_{1,2}^{(c)}(Eu, a) = \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(Eu)\mathbb{Q}_0^{(b)}(Ag)}{2}$$

$$\boxed{\text{z351}} \quad \mathbb{Q}_{1,1}^{(c)}(Eu, b) = -\frac{\sqrt{2}\mathbb{Q}_1^{(a)}(Au)\mathbb{Q}_{2,2}^{(b)}(Eg, 1)}{2}$$

$$\boxed{\text{z352}} \quad \mathbb{Q}_{1,2}^{(c)}(Eu, b) = \frac{\sqrt{2}\mathbb{Q}_1^{(a)}(Au)\mathbb{Q}_{2,1}^{(b)}(Eg, 1)}{2}$$

$$\boxed{\text{z353}} \quad \mathbb{Q}_{1,1}^{(c)}(Eu, c) = \frac{\sqrt{2}\mathbb{T}_{1,1}^{(a)}(Eu)\mathbb{T}_0^{(b)}(Ag)}{2}$$

$$\boxed{\text{z354}} \quad \mathbb{Q}_{1,2}^{(c)}(Eu, c) = \frac{\sqrt{2}\mathbb{T}_{1,2}^{(a)}(Eu)\mathbb{T}_0^{(b)}(Ag)}{2}$$

$$\boxed{\text{z355}} \quad \mathbb{Q}_{1,1}^{(c)}(Eu, d) = -\frac{\sqrt{2}\mathbb{T}_1^{(a)}(Au)\mathbb{M}_{1,2}^{(b)}(Eg)}{2}$$

$$\boxed{\text{z356}} \quad \mathbb{Q}_{1,2}^{(c)}(Eu, d) = \frac{\sqrt{2}\mathbb{T}_1^{(a)}(Au)\mathbb{M}_{1,1}^{(b)}(Eg)}{2}$$

$$\boxed{\text{z357}} \quad \mathbb{Q}_{3,1}^{(c)}(Eu, 2) = \frac{\mathbb{Q}_{1,1}^{(a)}(Eu)\mathbb{Q}_{2,1}^{(b)}(Eg, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(Eu)\mathbb{Q}_{2,2}^{(b)}(Eg, 1)}{2}$$

$$\boxed{\text{z358}} \quad \mathbb{Q}_{3,2}^{(c)}(Eu, 2) = -\frac{\mathbb{Q}_{1,1}^{(a)}(Eu)\mathbb{Q}_{2,2}^{(b)}(Eg, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(Eu)\mathbb{Q}_{2,1}^{(b)}(Eg, 1)}{2}$$

$$\boxed{\text{z359}} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(Eu, a) = -\frac{\sqrt{10}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{2,1}^{(b)}(Eg, 1)}{10} + \frac{\sqrt{10}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{2,2}^{(b)}(Eg, 1)}{10} - \frac{\sqrt{30}\mathbb{G}_2^{(1,-1;a)}(Au)\mathbb{Q}_{2,1}^{(b)}(Eg, 1)}{10}$$

$$\boxed{\text{z360}} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(Eu, a) = \frac{\sqrt{10}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{2,2}^{(b)}(Eg, 1)}{10} + \frac{\sqrt{10}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{2,1}^{(b)}(Eg, 1)}{10} - \frac{\sqrt{30}\mathbb{G}_2^{(1,-1;a)}(Au)\mathbb{Q}_{2,2}^{(b)}(Eg, 1)}{10}$$

$$\boxed{\text{z361}} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(Eu, b) = \frac{\sqrt{42}\mathbb{M}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{M}_{1,1}^{(b)}(Eg)}{14} - \frac{\sqrt{42}\mathbb{M}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{M}_{1,2}^{(b)}(Eg)}{14} - \frac{\sqrt{14}\mathbb{M}_2^{(1,-1;a)}(Au)\mathbb{M}_{1,1}^{(b)}(Eg)}{14}$$

$$\boxed{\text{z362}} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(Eu, b) = -\frac{\sqrt{42}\mathbb{M}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{M}_{1,2}^{(b)}(Eg)}{14} - \frac{\sqrt{42}\mathbb{M}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{M}_{1,1}^{(b)}(Eg)}{14} - \frac{\sqrt{14}\mathbb{M}_2^{(1,-1;a)}(Au)\mathbb{M}_{1,2}^{(b)}(Eg)}{14}$$

$$\begin{aligned}
\text{z363} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(Eu, 1a) &= \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{2,1}^{(b)}(Eg, 1)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{2,2}^{(b)}(Eg, 1)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(Au)\mathbb{Q}_{2,1}^{(b)}(Eg, 1)}{5} \\
\text{z364} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(Eu, 1a) &= -\frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{2,2}^{(b)}(Eg, 1)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{Q}_{2,1}^{(b)}(Eg, 1)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(Au)\mathbb{Q}_{2,2}^{(b)}(Eg, 1)}{5} \\
\text{z365} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(Eu, 1b) &= \frac{\sqrt{7}\mathbb{M}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{M}_{1,1}^{(b)}(Eg)}{14} - \frac{\sqrt{7}\mathbb{M}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{M}_{1,2}^{(b)}(Eg)}{14} + \frac{\sqrt{2}\mathbb{M}_2^{(1,-1;a)}(Au)\mathbb{M}_{1,1}^{(b)}(Eg)}{7} \\
\text{z366} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(Eu, 1b) &= -\frac{\sqrt{7}\mathbb{M}_{2,1}^{(1,-1;a)}(Eu, 2)\mathbb{M}_{1,2}^{(b)}(Eg)}{14} - \frac{\sqrt{7}\mathbb{M}_{2,2}^{(1,-1;a)}(Eu, 2)\mathbb{M}_{1,1}^{(b)}(Eg)}{14} + \frac{\sqrt{2}\mathbb{M}_2^{(1,-1;a)}(Au)\mathbb{M}_{1,2}^{(b)}(Eg)}{7} \\
\text{z367} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(Eu, 2) &= \frac{\mathbb{M}_{2,1}^{(1,-1;a)}(Eu, 1)\mathbb{M}_{1,1}^{(b)}(Eg)}{2} - \frac{\mathbb{M}_{2,2}^{(1,-1;a)}(Eu, 1)\mathbb{M}_{1,2}^{(b)}(Eg)}{2} \\
\text{z368} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(Eu, 2) &= -\frac{\mathbb{M}_{2,1}^{(1,-1;a)}(Eu, 1)\mathbb{M}_{1,2}^{(b)}(Eg)}{2} - \frac{\mathbb{M}_{2,2}^{(1,-1;a)}(Eu, 1)\mathbb{M}_{1,1}^{(b)}(Eg)}{2} \\
\text{z369} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(Eu, a) &= \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(Eu)\mathbb{Q}_0^{(b)}(Ag)}{2} \\
\text{z370} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(Eu, a) &= \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(Eu)\mathbb{Q}_0^{(b)}(Ag)}{2} \\
\text{z371} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(Eu, b) &= -\frac{\sqrt{2}\mathbb{Q}_1^{(1,0;a)}(Au)\mathbb{Q}_{2,2}^{(b)}(Eg, 1)}{2} \\
\text{z372} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(Eu, b) &= \frac{\sqrt{2}\mathbb{Q}_1^{(1,0;a)}(Au)\mathbb{Q}_{2,1}^{(b)}(Eg, 1)}{2} \\
\text{z373} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(Eu, c) &= \frac{\sqrt{2}\mathbb{T}_{1,1}^{(1,0;a)}(Eu)\mathbb{T}_0^{(b)}(Ag)}{2} \\
\text{z374} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(Eu, c) &= \frac{\sqrt{2}\mathbb{T}_{1,2}^{(1,0;a)}(Eu)\mathbb{T}_0^{(b)}(Ag)}{2} \\
\text{z375} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(Eu, d) &= -\frac{\sqrt{2}\mathbb{T}_1^{(1,0;a)}(Au)\mathbb{M}_{1,2}^{(b)}(Eg)}{2} \\
\text{z376} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(Eu, d) &= \frac{\sqrt{2}\mathbb{T}_1^{(1,0;a)}(Au)\mathbb{M}_{1,1}^{(b)}(Eg)}{2}
\end{aligned}$$

$$\begin{aligned}
\text{z377} \quad \mathbb{Q}_{3,1}^{(1,0;c)}(E_u, 2) &= \frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E_u)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E_u)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} \\
\text{z378} \quad \mathbb{Q}_{3,2}^{(1,0;c)}(E_u, 2) &= -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E_u)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E_u)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2} \\
\text{z379} \quad \mathbb{Q}_{1,1}^{(1,1;c)}(E_u) &= \frac{\sqrt{2}\mathbb{M}_0^{(1,1;a)}(A_u)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} \\
\text{z380} \quad \mathbb{Q}_{1,2}^{(1,1;c)}(E_u) &= \frac{\sqrt{2}\mathbb{M}_0^{(1,1;a)}(A_u)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} \\
\text{z381} \quad \mathbb{G}_{2,1}^{(c)}(E_u, 2) &= \frac{\mathbb{T}_{1,1}^{(a)}(E_u)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} - \frac{\mathbb{T}_{1,2}^{(a)}(E_u)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} \\
\text{z382} \quad \mathbb{G}_{2,2}^{(c)}(E_u, 2) &= -\frac{\mathbb{T}_{1,1}^{(a)}(E_u)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} - \frac{\mathbb{T}_{1,2}^{(a)}(E_u)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} \\
\text{z383} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E_u, 1a) &= \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_0^{(b)}(A_g)}{2} \\
\text{z384} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E_u, 1a) &= \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_0^{(b)}(A_g)}{2} \\
\text{z385} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E_u, 1b) &= \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E_u, 1)\mathbb{T}_0^{(b)}(A_g)}{2} \\
\text{z386} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E_u, 1b) &= \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E_u, 1)\mathbb{T}_0^{(b)}(A_g)}{2} \\
\text{z387} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E_u, 2a) &= \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_0^{(b)}(A_g)}{2} \\
\text{z388} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E_u, 2a) &= \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 2)\mathbb{Q}_0^{(b)}(A_g)}{2} \\
\text{z389} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E_u, 2b) &= -\frac{\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2} + \frac{\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} \\
\text{z390} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E_u, 2b) &= \frac{\mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} + \frac{\mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 1)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2}
\end{aligned}$$

$$\boxed{\text{z391}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E_u, 2c) = \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E_u, 2)\mathbb{T}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z392}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E_u, 2c) = \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E_u, 2)\mathbb{T}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z393}} \quad \mathbb{G}_{2,1}^{(1,0;c)}(E_u, 2) = \frac{\mathbb{T}_{1,1}^{(1,0;a)}(E_u)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} - \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E_u)\mathbb{M}_{1,2}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z394}} \quad \mathbb{G}_{2,2}^{(1,0;c)}(E_u, 2) = -\frac{\mathbb{T}_{1,1}^{(1,0;a)}(E_u)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} - \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E_u)\mathbb{M}_{1,1}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z395}} \quad \mathbb{G}_{2,1}^{(1,1;c)}(E_u, 1) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_u)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2}$$

$$\boxed{\text{z396}} \quad \mathbb{G}_{2,2}^{(1,1;c)}(E_u, 1) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_u)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2}$$

• 'A'-'A' bond-cluster

\* bra:  $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$

\* ket:  $|p_x, \uparrow \rangle, |p_x, \downarrow \rangle, |p_y, \uparrow \rangle, |p_y, \downarrow \rangle, |p_z, \uparrow \rangle, |p_z, \downarrow \rangle$

\* wyckoff: **6a06g**

$$\boxed{\text{z45}} \quad \mathbb{Q}_0^{(c)}(A_g, a) = \mathbb{Q}_0^{(a)}(A_g)\mathbb{Q}_0^{(b)}(A_g)$$

$$\boxed{\text{z46}} \quad \mathbb{Q}_0^{(c)}(A_g, b) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E_g, 1)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E_g, 1)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2}$$

$$\boxed{\text{z47}} \quad \mathbb{Q}_0^{(c)}(A_g, c) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(a)}(E_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} + \frac{\sqrt{2}\mathbb{M}_{1,2}^{(a)}(E_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z48}} \quad \mathbb{Q}_2^{(c)}(A_g) = \mathbb{Q}_2^{(a)}(A_g)\mathbb{Q}_0^{(b)}(A_g)$$

$$\boxed{\text{z49}} \quad \mathbb{Q}_4^{(c)}(A_g, 2) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2}$$

$$\boxed{\text{z50}} \quad \mathbb{Q}_4^{(c)}(A_g, 3) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2}$$



$$\begin{aligned}
\boxed{\text{z51}} \quad \mathbb{Q}_0^{(1,-1;c)}(A_g, a) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} \\
\boxed{\text{z52}} \quad \mathbb{Q}_0^{(1,-1;c)}(A_g, b) &= \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} + \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} \\
\boxed{\text{z53}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_g, a) &= \mathbb{Q}_2^{(1,-1;a)}(A_g)\mathbb{Q}_0^{(b)}(A_g) \\
\boxed{\text{z54}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_g, b) &= \frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 1)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} + \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 1)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} \\
\boxed{\text{z55}} \quad \mathbb{Q}_4^{(1,-1;c)}(A_g, 2a) &= -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2} \\
\boxed{\text{z56}} \quad \mathbb{Q}_4^{(1,-1;c)}(A_g, 2b) &= -\frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 2)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} + \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 2)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} \\
\boxed{\text{z57}} \quad \mathbb{Q}_4^{(1,-1;c)}(A_g, 3a) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} \\
\boxed{\text{z58}} \quad \mathbb{Q}_4^{(1,-1;c)}(A_g, 3b) &= \frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 2)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} + \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 2)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} \\
\boxed{\text{z59}} \quad \mathbb{Q}_2^{(1,0;c)}(A_g, a) &= \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E_g)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2} + \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E_g)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} \\
\boxed{\text{z60}} \quad \mathbb{Q}_2^{(1,0;c)}(A_g, b) &= \mathbb{T}_2^{(1,0;a)}(A_g)\mathbb{T}_0^{(b)}(A_g) \\
\boxed{\text{z61}} \quad \mathbb{Q}_2^{(1,0;c)}(A_g, c) &= -\frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 1)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} - \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 1)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} \\
\boxed{\text{z62}} \quad \mathbb{Q}_0^{(1,1;c)}(A_g, a) &= \mathbb{Q}_0^{(1,1;a)}(A_g)\mathbb{Q}_0^{(b)}(A_g) \\
\boxed{\text{z63}} \quad \mathbb{Q}_0^{(1,1;c)}(A_g, b) &= \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,1;a)}(E_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} + \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,1;a)}(E_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} \\
\boxed{\text{z64}} \quad \mathbb{G}_1^{(c)}(A_g, a) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E_g, 1)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E_g, 1)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2}
\end{aligned}$$

$$\boxed{\text{z65}} \quad \mathbb{G}_1^{(c)}(A_g, b) = \mathbb{M}_1^{(a)}(A_g) \mathbb{T}_0^{(b)}(A_g)$$

$$\boxed{\text{z66}} \quad \mathbb{G}_1^{(c)}(A_g, c) = \frac{\sqrt{2} \mathbb{M}_{1,1}^{(a)}(E_g) \mathbb{M}_{1,2}^{(b)}(E_g)}{2} - \frac{\sqrt{2} \mathbb{M}_{1,2}^{(a)}(E_g) \mathbb{M}_{1,1}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z67}} \quad \mathbb{G}_1^{(1,-1;c)}(A_g, a) = \frac{\sqrt{2} \mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 1) \mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} - \frac{\sqrt{2} \mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 1) \mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2}$$

$$\boxed{\text{z68}} \quad \mathbb{G}_1^{(1,-1;c)}(A_g, b) = \mathbb{M}_1^{(1,-1;a)}(A_g) \mathbb{T}_0^{(b)}(A_g)$$

$$\boxed{\text{z69}} \quad \mathbb{G}_1^{(1,-1;c)}(A_g, c) = \frac{\sqrt{2} \mathbb{M}_{1,1}^{(1,-1;a)}(E_g) \mathbb{M}_{1,2}^{(b)}(E_g)}{2} - \frac{\sqrt{2} \mathbb{M}_{1,2}^{(1,-1;a)}(E_g) \mathbb{M}_{1,1}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z70}} \quad \mathbb{G}_3^{(1,-1;c)}(A_g, 1a) = \mathbb{M}_3^{(1,-1;a)}(A_g, 1) \mathbb{T}_0^{(b)}(A_g)$$

$$\boxed{\text{z71}} \quad \mathbb{G}_3^{(1,-1;c)}(A_g, 1b) = \frac{\sqrt{2} \mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 1) \mathbb{M}_{1,2}^{(b)}(E_g)}{2} - \frac{\sqrt{2} \mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 1) \mathbb{M}_{1,1}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z72}} \quad \mathbb{G}_3^{(1,-1;c)}(A_g, 2) = \mathbb{M}_3^{(1,-1;a)}(A_g, 2) \mathbb{T}_0^{(b)}(A_g)$$

$$\boxed{\text{z73}} \quad \mathbb{G}_3^{(1,-1;c)}(A_g, 3) = \mathbb{M}_3^{(1,-1;a)}(A_g, 3) \mathbb{T}_0^{(b)}(A_g)$$

$$\boxed{\text{z74}} \quad \mathbb{G}_1^{(1,0;c)}(A_g, a) = \mathbb{G}_1^{(1,0;a)}(A_g) \mathbb{Q}_0^{(b)}(A_g)$$

$$\boxed{\text{z75}} \quad \mathbb{G}_1^{(1,0;c)}(A_g, b) = -\frac{\sqrt{2} \mathbb{G}_{1,1}^{(1,0;a)}(E_g) \mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} + \frac{\sqrt{2} \mathbb{G}_{1,2}^{(1,0;a)}(E_g) \mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2}$$

$$\boxed{\text{z76}} \quad \mathbb{G}_1^{(1,0;c)}(A_g, c) = \frac{\sqrt{2} \mathbb{T}_{2,1}^{(1,0;a)}(E_g, 1) \mathbb{M}_{1,2}^{(b)}(E_g)}{2} - \frac{\sqrt{2} \mathbb{T}_{2,2}^{(1,0;a)}(E_g, 1) \mathbb{M}_{1,1}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z77}} \quad \mathbb{G}_3^{(1,0;c)}(A_g, 2) = \frac{\sqrt{2} \mathbb{T}_{2,1}^{(1,0;a)}(E_g, 2) \mathbb{M}_{1,2}^{(b)}(E_g)}{2} - \frac{\sqrt{2} \mathbb{T}_{2,2}^{(1,0;a)}(E_g, 2) \mathbb{M}_{1,1}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z78}} \quad \mathbb{G}_3^{(1,0;c)}(A_g, 3) = \frac{\sqrt{2} \mathbb{T}_{2,1}^{(1,0;a)}(E_g, 2) \mathbb{M}_{1,1}^{(b)}(E_g)}{2} + \frac{\sqrt{2} \mathbb{T}_{2,2}^{(1,0;a)}(E_g, 2) \mathbb{M}_{1,2}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z79}} \quad \mathbb{G}_1^{(1,1;c)}(A_g, a) = \mathbb{M}_1^{(1,1;a)}(A_g) \mathbb{T}_0^{(b)}(A_g)$$

$$\boxed{\text{z80}} \quad \mathbb{G}_1^{(1,1;c)}(A_g, b) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,1;a)}(E_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,1;a)}(E_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z169}} \quad \mathbb{Q}_1^{(c)}(A_u, a) = \mathbb{Q}_0^{(a)}(A_g)\mathbb{Q}_1^{(b)}(A_u)$$

$$\boxed{\text{z170}} \quad \mathbb{Q}_1^{(c)}(A_u, b) = \frac{\sqrt{30}\mathbb{Q}_{2,1}^{(a)}(E_g, 1)\mathbb{Q}_{1,2}^{(b)}(E_u)}{10} - \frac{\sqrt{30}\mathbb{Q}_{2,2}^{(a)}(E_g, 1)\mathbb{Q}_{1,1}^{(b)}(E_u)}{10} + \frac{\sqrt{10}\mathbb{Q}_2^{(a)}(A_g)\mathbb{Q}_1^{(b)}(A_u)}{5}$$

$$\boxed{\text{z171}} \quad \mathbb{Q}_1^{(c)}(A_u, c) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(a)}(E_g)\mathbb{T}_{1,2}^{(b)}(E_u)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(a)}(E_g)\mathbb{T}_{1,1}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z172}} \quad \mathbb{Q}_3^{(c)}(A_u, 1) = -\frac{\sqrt{5}\mathbb{Q}_{2,1}^{(a)}(E_g, 1)\mathbb{Q}_{1,2}^{(b)}(E_u)}{5} + \frac{\sqrt{5}\mathbb{Q}_{2,2}^{(a)}(E_g, 1)\mathbb{Q}_{1,1}^{(b)}(E_u)}{5} + \frac{\sqrt{15}\mathbb{Q}_2^{(a)}(A_g)\mathbb{Q}_1^{(b)}(A_u)}{5}$$

$$\boxed{\text{z173}} \quad \mathbb{Q}_3^{(c)}(A_u, 2) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_{1,2}^{(b)}(E_u)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_{1,1}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z174}} \quad \mathbb{Q}_3^{(c)}(A_u, 3) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_{1,1}^{(b)}(E_u)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_{1,2}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z175}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_u, a) = \frac{\sqrt{30}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{1,2}^{(b)}(E_u)}{10} - \frac{\sqrt{30}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{1,1}^{(b)}(E_u)}{10} + \frac{\sqrt{10}\mathbb{Q}_2^{(1,-1;a)}(A_g)\mathbb{Q}_1^{(b)}(A_u)}{5}$$

$$\boxed{\text{z176}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_u, b) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{T}_{1,2}^{(b)}(E_u)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{T}_{1,1}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z177}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_u, 1a) = -\frac{\sqrt{5}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{1,2}^{(b)}(E_u)}{5} + \frac{\sqrt{5}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{1,1}^{(b)}(E_u)}{5} + \frac{\sqrt{15}\mathbb{Q}_2^{(1,-1;a)}(A_g)\mathbb{Q}_1^{(b)}(A_u)}{5}$$

$$\boxed{\text{z178}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_u, 1b) = \frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 1)\mathbb{T}_{1,2}^{(b)}(E_u)}{2} - \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 1)\mathbb{T}_{1,1}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z179}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_u, 2a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{1,2}^{(b)}(E_u)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{1,1}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z180}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_u, 2b) = -\frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 2)\mathbb{T}_{1,2}^{(b)}(E_u)}{4} + \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 2)\mathbb{T}_{1,1}^{(b)}(E_u)}{4} - \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(A_g, 3)\mathbb{T}_1^{(b)}(A_u)}{2}$$

$$\boxed{\text{z181}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_u, 3a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{1,1}^{(b)}(E_u)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{1,2}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z182}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_u, 3b) = -\frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 2)\mathbb{T}_{1,1}^{(b)}(E_u)}{4} - \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 2)\mathbb{T}_{1,2}^{(b)}(E_u)}{4} + \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(A_g, 2)\mathbb{T}_1^{(b)}(A_u)}{2}$$

$$\boxed{\text{z183}} \quad \mathbb{Q}_1^{(1,0;c)}(A_u, a) = \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E_g)\mathbb{Q}_{1,2}^{(b)}(E_u)}{2} - \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E_g)\mathbb{Q}_{1,1}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z184}} \quad \mathbb{Q}_1^{(1,0;c)}(A_u, b) = \frac{\sqrt{30}\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 1)\mathbb{T}_{1,2}^{(b)}(E_u)}{10} - \frac{\sqrt{30}\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 1)\mathbb{T}_{1,1}^{(b)}(E_u)}{10} + \frac{\sqrt{10}\mathbb{T}_2^{(1,0;a)}(A_g)\mathbb{T}_1^{(b)}(A_u)}{5}$$

$$\boxed{\text{z185}} \quad \mathbb{Q}_3^{(1,0;c)}(A_u, 1) = -\frac{\sqrt{5}\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 1)\mathbb{T}_{1,2}^{(b)}(E_u)}{5} + \frac{\sqrt{5}\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 1)\mathbb{T}_{1,1}^{(b)}(E_u)}{5} + \frac{\sqrt{15}\mathbb{T}_2^{(1,0;a)}(A_g)\mathbb{T}_1^{(b)}(A_u)}{5}$$

$$\boxed{\text{z186}} \quad \mathbb{Q}_3^{(1,0;c)}(A_u, 2) = \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 2)\mathbb{T}_{1,2}^{(b)}(E_u)}{2} - \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 2)\mathbb{T}_{1,1}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z187}} \quad \mathbb{Q}_3^{(1,0;c)}(A_u, 3) = \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 2)\mathbb{T}_{1,1}^{(b)}(E_u)}{2} + \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 2)\mathbb{T}_{1,2}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z188}} \quad \mathbb{Q}_1^{(1,1;c)}(A_u, a) = \mathbb{Q}_0^{(1,1;a)}(A_g)\mathbb{Q}_1^{(b)}(A_u)$$

$$\boxed{\text{z189}} \quad \mathbb{Q}_1^{(1,1;c)}(A_u, b) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,1;a)}(E_g)\mathbb{T}_{1,2}^{(b)}(E_u)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,1;a)}(E_g)\mathbb{T}_{1,1}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z190}} \quad \mathbb{G}_0^{(c)}(A_u) = \frac{\sqrt{3}\mathbb{M}_{1,1}^{(a)}(E_g)\mathbb{T}_{1,1}^{(b)}(E_u)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(a)}(E_g)\mathbb{T}_{1,2}^{(b)}(E_u)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(a)}(A_g)\mathbb{T}_1^{(b)}(A_u)}{3}$$

$$\boxed{\text{z191}} \quad \mathbb{G}_2^{(c)}(A_u, a) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E_g, 1)\mathbb{Q}_{1,1}^{(b)}(E_u)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E_g, 1)\mathbb{Q}_{1,2}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z192}} \quad \mathbb{G}_2^{(c)}(A_u, b) = -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(a)}(E_g)\mathbb{T}_{1,1}^{(b)}(E_u)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(a)}(E_g)\mathbb{T}_{1,2}^{(b)}(E_u)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(a)}(A_g)\mathbb{T}_1^{(b)}(A_u)}{3}$$

$$\boxed{\text{z193}} \quad \mathbb{G}_0^{(1,-1;c)}(A_u) = \frac{\sqrt{3}\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{T}_{1,1}^{(b)}(E_u)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{T}_{1,2}^{(b)}(E_u)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(1,-1;a)}(A_g)\mathbb{T}_1^{(b)}(A_u)}{3}$$

$$\boxed{\text{z194}} \quad \mathbb{G}_2^{(1,-1;c)}(A_u, a) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{1,1}^{(b)}(E_u)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{1,2}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z195}} \quad \mathbb{G}_2^{(1,-1;c)}(A_u, b) = -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{T}_{1,1}^{(b)}(E_u)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{T}_{1,2}^{(b)}(E_u)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(1,-1;a)}(A_g)\mathbb{T}_1^{(b)}(A_u)}{3}$$

$$\begin{aligned}
\text{z196} \quad \mathbb{G}_2^{(1,-1;c)}(A_u, c) &= \frac{\sqrt{14}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 1)\mathbb{T}_{1,1}^{(b)}(E_u)}{7} + \frac{\sqrt{14}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 1)\mathbb{T}_{1,2}^{(b)}(E_u)}{7} + \frac{\sqrt{21}\mathbb{M}_3^{(1,-1;a)}(A_g, 1)\mathbb{T}_1^{(b)}(A_u)}{7} \\
\text{z197} \quad \mathbb{G}_4^{(1,-1;c)}(A_u, 1) &= -\frac{\sqrt{42}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 1)\mathbb{T}_{1,1}^{(b)}(E_u)}{14} - \frac{\sqrt{42}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 1)\mathbb{T}_{1,2}^{(b)}(E_u)}{14} + \frac{2\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_g, 1)\mathbb{T}_1^{(b)}(A_u)}{7} \\
\text{z198} \quad \mathbb{G}_4^{(1,-1;c)}(A_u, 2) &= -\frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 2)\mathbb{T}_{1,2}^{(b)}(E_u)}{4} + \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 2)\mathbb{T}_{1,1}^{(b)}(E_u)}{4} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_g, 3)\mathbb{T}_1^{(b)}(A_u)}{2} \\
\text{z199} \quad \mathbb{G}_4^{(1,-1;c)}(A_u, 3) &= \frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 2)\mathbb{T}_{1,1}^{(b)}(E_u)}{4} + \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 2)\mathbb{T}_{1,2}^{(b)}(E_u)}{4} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_g, 2)\mathbb{T}_1^{(b)}(A_u)}{2} \\
\text{z200} \quad \mathbb{G}_0^{(1,0;c)}(A_u) &= \frac{\sqrt{3}\mathbb{G}_{1,1}^{(1,0;a)}(E_g)\mathbb{Q}_{1,1}^{(b)}(E_u)}{3} + \frac{\sqrt{3}\mathbb{G}_{1,2}^{(1,0;a)}(E_g)\mathbb{Q}_{1,2}^{(b)}(E_u)}{3} + \frac{\sqrt{3}\mathbb{G}_1^{(1,0;a)}(A_g)\mathbb{Q}_1^{(b)}(A_u)}{3} \\
\text{z201} \quad \mathbb{G}_2^{(1,0;c)}(A_u, a) &= -\frac{\sqrt{6}\mathbb{G}_{1,1}^{(1,0;a)}(E_g)\mathbb{Q}_{1,1}^{(b)}(E_u)}{6} - \frac{\sqrt{6}\mathbb{G}_{1,2}^{(1,0;a)}(E_g)\mathbb{Q}_{1,2}^{(b)}(E_u)}{6} + \frac{\sqrt{6}\mathbb{G}_1^{(1,0;a)}(A_g)\mathbb{Q}_1^{(b)}(A_u)}{3} \\
\text{z202} \quad \mathbb{G}_2^{(1,0;c)}(A_u, b) &= -\frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 1)\mathbb{T}_{1,1}^{(b)}(E_u)}{2} - \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 1)\mathbb{T}_{1,2}^{(b)}(E_u)}{2} \\
\text{z203} \quad \mathbb{G}_0^{(1,1;c)}(A_u) &= \frac{\sqrt{3}\mathbb{M}_{1,1}^{(1,1;a)}(E_g)\mathbb{T}_{1,1}^{(b)}(E_u)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(1,1;a)}(E_g)\mathbb{T}_{1,2}^{(b)}(E_u)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(1,1;a)}(A_g)\mathbb{T}_1^{(b)}(A_u)}{3} \\
\text{z204} \quad \mathbb{G}_2^{(1,1;c)}(A_u) &= -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(1,1;a)}(E_g)\mathbb{T}_{1,1}^{(b)}(E_u)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(1,1;a)}(E_g)\mathbb{T}_{1,2}^{(b)}(E_u)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(1,1;a)}(A_g)\mathbb{T}_1^{(b)}(A_u)}{3} \\
\text{z205} \quad \mathbb{Q}_{2,1}^{(c)}(E_g, 1a) &= \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_g)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2} \\
\text{z206} \quad \mathbb{Q}_{2,2}^{(c)}(E_g, 1a) &= \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_g)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} \\
\text{z207} \quad \mathbb{Q}_{2,1}^{(c)}(E_g, 1b) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E_g, 1)\mathbb{Q}_0^{(b)}(A_g)}{2} \\
\text{z208} \quad \mathbb{Q}_{2,2}^{(c)}(E_g, 1b) &= \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E_g, 1)\mathbb{Q}_0^{(b)}(A_g)}{2} \\
\text{z209} \quad \mathbb{Q}_{2,1}^{(c)}(E_g, 1c) &= -\frac{\sqrt{42}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(a)}(A_g)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{14}
\end{aligned}$$

$$\boxed{\text{z210}} \quad \mathbb{Q}_{2,2}^{(c)}(E_g, 1c) = \frac{\sqrt{42}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(a)}(A_g)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{14}$$

$$\boxed{\text{z211}} \quad \mathbb{Q}_{2,1}^{(c)}(E_g, 1d) = \frac{\sqrt{2}\mathbb{M}_1^{(a)}(A_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z212}} \quad \mathbb{Q}_{2,2}^{(c)}(E_g, 1d) = -\frac{\sqrt{2}\mathbb{M}_1^{(a)}(A_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z213}} \quad \mathbb{Q}_{2,1}^{(c)}(E_g, 2a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z214}} \quad \mathbb{Q}_{2,2}^{(c)}(E_g, 2a) = \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z215}} \quad \mathbb{Q}_{2,1}^{(c)}(E_g, 2b) = -\frac{\mathbb{Q}_{2,1}^{(a)}(E_g, 1)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(a)}(E_g, 1)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2}$$

$$\boxed{\text{z216}} \quad \mathbb{Q}_{2,2}^{(c)}(E_g, 2b) = \frac{\mathbb{Q}_{2,1}^{(a)}(E_g, 1)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(a)}(E_g, 1)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2}$$

$$\boxed{\text{z217}} \quad \mathbb{Q}_{2,1}^{(c)}(E_g, 2c) = \frac{\mathbb{M}_{1,1}^{(a)}(E_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} - \frac{\mathbb{M}_{1,2}^{(a)}(E_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z218}} \quad \mathbb{Q}_{2,2}^{(c)}(E_g, 2c) = -\frac{\mathbb{M}_{1,1}^{(a)}(E_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} - \frac{\mathbb{M}_{1,2}^{(a)}(E_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z219}} \quad \mathbb{Q}_{4,1}^{(c)}(E_g, 1) = \frac{\sqrt{7}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_g)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{7}$$

$$\boxed{\text{z220}} \quad \mathbb{Q}_{4,2}^{(c)}(E_g, 1) = -\frac{\sqrt{7}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_g)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{7}$$

$$\boxed{\text{z221}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E_g, 1a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z222}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E_g, 1a) = \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z223}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E_g, 1b) = -\frac{\sqrt{42}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(1,-1;a)}(A_g)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{14}$$

$$\begin{aligned}
\text{z224} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E_g, 1b) &= \frac{\sqrt{42}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(1,-1;a)}(A_g)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{14} \\
\text{z225} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E_g, 1c) &= \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(A_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} \\
\text{z226} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E_g, 1c) &= -\frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(A_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} \\
\text{z227} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E_g, 1d) &= \frac{\sqrt{130}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 2)\mathbb{M}_{1,1}^{(b)}(E_g)}{26} - \frac{\sqrt{130}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 2)\mathbb{M}_{1,2}^{(b)}(E_g)}{26} - \frac{\sqrt{78}\mathbb{M}_3^{(1,-1;a)}(A_g, 1)\mathbb{M}_{1,2}^{(b)}(E_g)}{26} \\
\text{z228} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E_g, 1d) &= -\frac{\sqrt{130}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 2)\mathbb{M}_{1,2}^{(b)}(E_g)}{26} - \frac{\sqrt{130}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 2)\mathbb{M}_{1,1}^{(b)}(E_g)}{26} + \frac{\sqrt{78}\mathbb{M}_3^{(1,-1;a)}(A_g, 1)\mathbb{M}_{1,1}^{(b)}(E_g)}{26} \\
\text{z229} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E_g, 2a) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_0^{(b)}(A_g)}{2} \\
\text{z230} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E_g, 2a) &= \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_0^{(b)}(A_g)}{2} \\
\text{z231} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E_g, 2b) &= -\frac{\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} \\
\text{z232} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E_g, 2b) &= \frac{\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2} \\
\text{z233} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E_g, 2c) &= \frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} \\
\text{z234} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E_g, 2c) &= -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} \\
\text{z235} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E_g, 2d) &= -\frac{\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 1)\mathbb{M}_{1,1}^{(b)}(E_g)}{8} + \frac{\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 1)\mathbb{M}_{1,2}^{(b)}(E_g)}{8} + \frac{\sqrt{15}\mathbb{M}_3^{(1,-1;a)}(A_g, 2)\mathbb{M}_{1,2}^{(b)}(E_g)}{8} + \frac{\sqrt{15}\mathbb{M}_3^{(1,-1;a)}(A_g, 3)\mathbb{M}_{1,1}^{(b)}(E_g)}{8} \\
\text{z236} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E_g, 2d) &= \frac{\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 1)\mathbb{M}_{1,2}^{(b)}(E_g)}{8} + \frac{\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 1)\mathbb{M}_{1,1}^{(b)}(E_g)}{8} - \frac{\sqrt{15}\mathbb{M}_3^{(1,-1;a)}(A_g, 2)\mathbb{M}_{1,1}^{(b)}(E_g)}{8} + \frac{\sqrt{15}\mathbb{M}_3^{(1,-1;a)}(A_g, 3)\mathbb{M}_{1,2}^{(b)}(E_g)}{8} \\
\text{z237} \quad \mathbb{Q}_{4,1}^{(1,-1;c)}(E_g, 1a) &= \frac{\sqrt{7}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_g)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{7}
\end{aligned}$$

$$\begin{aligned}
\text{z238} \quad \mathbb{Q}_{4,2}^{(1,-1;c)}(E_g, 1a) &= -\frac{\sqrt{7}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_g)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{7} \\
\text{z239} \quad \mathbb{Q}_{4,1}^{(1,-1;c)}(E_g, 1b) &= \frac{\sqrt{39}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 2)\mathbb{M}_{1,1}^{(b)}(E_g)}{26} - \frac{\sqrt{39}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 2)\mathbb{M}_{1,2}^{(b)}(E_g)}{26} + \frac{\sqrt{65}\mathbb{M}_3^{(1,-1;a)}(A_g, 1)\mathbb{M}_{1,2}^{(b)}(E_g)}{13} \\
\text{z240} \quad \mathbb{Q}_{4,2}^{(1,-1;c)}(E_g, 1b) &= -\frac{\sqrt{39}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 2)\mathbb{M}_{1,2}^{(b)}(E_g)}{26} - \frac{\sqrt{39}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 2)\mathbb{M}_{1,1}^{(b)}(E_g)}{26} - \frac{\sqrt{65}\mathbb{M}_3^{(1,-1;a)}(A_g, 1)\mathbb{M}_{1,1}^{(b)}(E_g)}{13} \\
\text{z281} \quad \mathbb{Q}_{4,1}^{(1,-1;c)}(E_g, 2) &= -\frac{\mathbb{M}_3^{(1,-1;a)}(A_g, 2)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_g, 3)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} \\
\text{z282} \quad \mathbb{Q}_{4,2}^{(1,-1;c)}(E_g, 2) &= \frac{\mathbb{M}_3^{(1,-1;a)}(A_g, 2)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_g, 3)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} \\
\text{z283} \quad \mathbb{Q}_{4,1}^{(1,-1;c)}(E_g, 3) &= \frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 1)\mathbb{M}_{1,1}^{(b)}(E_g)}{8} - \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 1)\mathbb{M}_{1,2}^{(b)}(E_g)}{8} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_g, 2)\mathbb{M}_{1,2}^{(b)}(E_g)}{8} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_g, 3)\mathbb{M}_{1,1}^{(b)}(E_g)}{8} \\
\text{z284} \quad \mathbb{Q}_{4,2}^{(1,-1;c)}(E_g, 3) &= -\frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 1)\mathbb{M}_{1,2}^{(b)}(E_g)}{8} - \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 1)\mathbb{M}_{1,1}^{(b)}(E_g)}{8} - \frac{\mathbb{M}_3^{(1,-1;a)}(A_g, 2)\mathbb{M}_{1,1}^{(b)}(E_g)}{8} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_g, 3)\mathbb{M}_{1,2}^{(b)}(E_g)}{8} \\
\text{z285} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E_g, 1a) &= -\frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(A_g)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} \\
\text{z286} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E_g, 1a) &= \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(A_g)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2} \\
\text{z287} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E_g, 1b) &= \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 1)\mathbb{T}_0^{(b)}(A_g)}{2} \\
\text{z288} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E_g, 1b) &= \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 1)\mathbb{T}_0^{(b)}(A_g)}{2} \\
\text{z289} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E_g, 1c) &= \frac{\sqrt{10}\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 2)\mathbb{M}_{1,1}^{(b)}(E_g)}{10} - \frac{\sqrt{10}\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 2)\mathbb{M}_{1,2}^{(b)}(E_g)}{10} + \frac{\sqrt{30}\mathbb{T}_2^{(1,0;a)}(A_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{10} \\
\text{z290} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E_g, 1c) &= -\frac{\sqrt{10}\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 2)\mathbb{M}_{1,2}^{(b)}(E_g)}{10} - \frac{\sqrt{10}\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 2)\mathbb{M}_{1,1}^{(b)}(E_g)}{10} + \frac{\sqrt{30}\mathbb{T}_2^{(1,0;a)}(A_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{10} \\
\text{z291} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E_g, 2a) &= \frac{\mathbb{G}_{1,1}^{(1,0;a)}(E_g)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E_g)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2}
\end{aligned}$$



$$\boxed{\text{z292}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E_g, 2a) = -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E_g)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E_g)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2}$$

$$\boxed{\text{z293}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E_g, 2b) = \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 2)\mathbb{T}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z294}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E_g, 2b) = \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 2)\mathbb{T}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z295}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E_g, 2c) = -\frac{\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 1)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} + \frac{\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 1)\mathbb{M}_{1,2}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z296}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E_g, 2c) = \frac{\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 1)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} + \frac{\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 1)\mathbb{M}_{1,1}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z297}} \quad \mathbb{Q}_{2,1}^{(1,1;c)}(E_g, 1a) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_g)\mathbb{Q}_{2,1}^{(b)}(E_g, 1)}{2}$$

$$\boxed{\text{z298}} \quad \mathbb{Q}_{2,2}^{(1,1;c)}(E_g, 1a) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_g)\mathbb{Q}_{2,2}^{(b)}(E_g, 1)}{2}$$

$$\boxed{\text{z299}} \quad \mathbb{Q}_{2,1}^{(1,1;c)}(E_g, 1b) = \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(A_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z300}} \quad \mathbb{Q}_{2,2}^{(1,1;c)}(E_g, 1b) = -\frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(A_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z301}} \quad \mathbb{Q}_{2,1}^{(1,1;c)}(E_g, 2) = \frac{\mathbb{M}_{1,1}^{(1,1;a)}(E_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{2} - \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z302}} \quad \mathbb{Q}_{2,2}^{(1,1;c)}(E_g, 2) = -\frac{\mathbb{M}_{1,1}^{(1,1;a)}(E_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{2} - \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{2}$$

$$\boxed{\text{z303}} \quad \mathbb{G}_{1,1}^{(c)}(E_g) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(a)}(E_g)\mathbb{T}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z304}} \quad \mathbb{G}_{1,2}^{(c)}(E_g) = \frac{\sqrt{2}\mathbb{M}_{1,2}^{(a)}(E_g)\mathbb{T}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z305}} \quad \mathbb{G}_{1,1}^{(1,-1;c)}(E_g) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{T}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z306}} \quad \mathbb{G}_{1,2}^{(1,-1;c)}(E_g) = \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{T}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z307}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E_g, 1) = \frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 1)\mathbb{T}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z308}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E_g, 1) = \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 1)\mathbb{T}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z309}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E_g, 2) = \frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 2)\mathbb{T}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z310}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E_g, 2) = \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 2)\mathbb{T}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z311}} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E_g, a) = \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E_g)\mathbb{Q}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z312}} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E_g, a) = \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E_g)\mathbb{Q}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z313}} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E_g, b) = \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 2)\mathbb{M}_{1,1}^{(b)}(E_g)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 2)\mathbb{M}_{1,2}^{(b)}(E_g)}{10} - \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_g)\mathbb{M}_{1,1}^{(b)}(E_g)}{5}$$

$$\boxed{\text{z314}} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E_g, b) = -\frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 2)\mathbb{M}_{1,2}^{(b)}(E_g)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 2)\mathbb{M}_{1,1}^{(b)}(E_g)}{10} - \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_g)\mathbb{M}_{1,2}^{(b)}(E_g)}{5}$$

$$\boxed{\text{z315}} \quad \mathbb{G}_{1,1}^{(1,1;c)}(E_g) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,1;a)}(E_g)\mathbb{T}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z316}} \quad \mathbb{G}_{1,2}^{(1,1;c)}(E_g) = \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,1;a)}(E_g)\mathbb{T}_0^{(b)}(A_g)}{2}$$

$$\boxed{\text{z397}} \quad \mathbb{Q}_{1,1}^{(c)}(E_u, a) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_g)\mathbb{Q}_{1,1}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z398}} \quad \mathbb{Q}_{1,2}^{(c)}(E_u, a) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_g)\mathbb{Q}_{1,2}^{(b)}(E_u)}{2}$$

$$\boxed{\text{z399}} \quad \mathbb{Q}_{1,1}^{(c)}(E_u, b) = \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_{1,1}^{(b)}(E_u)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E_g, 1)\mathbb{Q}_1^{(b)}(A_u)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_{1,2}^{(b)}(E_u)}{10} - \frac{\sqrt{5}\mathbb{Q}_2^{(a)}(A_g)\mathbb{Q}_{1,1}^{(b)}(E_u)}{10}$$

$$\begin{aligned}
\text{z400} \quad \mathbb{Q}_{1,2}^{(c)}(Eu, b) &= \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(Eg, 1)\mathbb{Q}_1^{(b)}(Au)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(Eg, 2)\mathbb{Q}_{1,2}^{(b)}(Eu)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(Eg, 2)\mathbb{Q}_{1,1}^{(b)}(Eu)}{10} - \frac{\sqrt{5}\mathbb{Q}_2^{(a)}(Ag)\mathbb{Q}_{1,2}^{(b)}(Eu)}{10} \\
\text{z401} \quad \mathbb{Q}_{1,1}^{(c)}(Eu, c) &= \frac{\mathbb{M}_{1,2}^{(a)}(Eg)\mathbb{T}_1^{(b)}(Au)}{2} - \frac{\mathbb{M}_1^{(a)}(Ag)\mathbb{T}_{1,2}^{(b)}(Eu)}{2} \\
\text{z402} \quad \mathbb{Q}_{1,2}^{(c)}(Eu, c) &= -\frac{\mathbb{M}_{1,1}^{(a)}(Eg)\mathbb{T}_1^{(b)}(Au)}{2} + \frac{\mathbb{M}_1^{(a)}(Ag)\mathbb{T}_{1,1}^{(b)}(Eu)}{2} \\
\text{z403} \quad \mathbb{Q}_{3,1}^{(c)}(Eu, 1) &= -\frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(Eg, 2)\mathbb{Q}_{1,1}^{(b)}(Eu)}{30} - \frac{2\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(Eg, 1)\mathbb{Q}_1^{(b)}(Au)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(Eg, 2)\mathbb{Q}_{1,2}^{(b)}(Eu)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(a)}(Ag)\mathbb{Q}_{1,1}^{(b)}(Eu)}{5} \\
\text{z404} \quad \mathbb{Q}_{3,2}^{(c)}(Eu, 1) &= \frac{2\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(Eg, 1)\mathbb{Q}_1^{(b)}(Au)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(Eg, 2)\mathbb{Q}_{1,2}^{(b)}(Eu)}{30} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(Eg, 2)\mathbb{Q}_{1,1}^{(b)}(Eu)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(a)}(Ag)\mathbb{Q}_{1,2}^{(b)}(Eu)}{5} \\
\text{z405} \quad \mathbb{Q}_{3,1}^{(c)}(Eu, 2) &= \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(a)}(Eg, 1)\mathbb{Q}_{1,1}^{(b)}(Eu)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(a)}(Eg, 1)\mathbb{Q}_{1,2}^{(b)}(Eu)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(a)}(Eg, 2)\mathbb{Q}_1^{(b)}(Au)}{6} \\
\text{z406} \quad \mathbb{Q}_{3,2}^{(c)}(Eu, 2) &= -\frac{\sqrt{6}\mathbb{Q}_{2,1}^{(a)}(Eg, 1)\mathbb{Q}_{1,2}^{(b)}(Eu)}{6} + \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(a)}(Eg, 2)\mathbb{Q}_1^{(b)}(Au)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(a)}(Eg, 1)\mathbb{Q}_{1,1}^{(b)}(Eu)}{6} \\
\text{z407} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(Eu, a) &= \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(Eg, 2)\mathbb{Q}_{1,1}^{(b)}(Eu)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(Eg, 1)\mathbb{Q}_1^{(b)}(Au)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(Eg, 2)\mathbb{Q}_{1,2}^{(b)}(Eu)}{10} - \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(Ag)\mathbb{Q}_{1,1}^{(b)}(Eu)}{10} \\
\text{z408} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(Eu, a) &= \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(Eg, 1)\mathbb{Q}_1^{(b)}(Au)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(Eg, 2)\mathbb{Q}_{1,2}^{(b)}(Eu)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(Eg, 2)\mathbb{Q}_{1,1}^{(b)}(Eu)}{10} - \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(Ag)\mathbb{Q}_{1,2}^{(b)}(Eu)}{10} \\
\text{z409} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(Eu, b) &= \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(Eg)\mathbb{T}_1^{(b)}(Au)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(Ag)\mathbb{T}_{1,2}^{(b)}(Eu)}{2} \\
\text{z410} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(Eu, b) &= -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(Eg)\mathbb{T}_1^{(b)}(Au)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(Ag)\mathbb{T}_{1,1}^{(b)}(Eu)}{2} \\
\text{z411} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(Eu, 1a) &= -\frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(Eg, 2)\mathbb{Q}_{1,1}^{(b)}(Eu)}{30} - \frac{2\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(Eg, 1)\mathbb{Q}_1^{(b)}(Au)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(Eg, 2)\mathbb{Q}_{1,2}^{(b)}(Eu)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(Ag)\mathbb{Q}_{1,1}^{(b)}(Eu)}{5} \\
\text{z412} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(Eu, 1a) &= \frac{2\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(Eg, 1)\mathbb{Q}_1^{(b)}(Au)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(Eg, 2)\mathbb{Q}_{1,2}^{(b)}(Eu)}{30} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(Eg, 2)\mathbb{Q}_{1,1}^{(b)}(Eu)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(Ag)\mathbb{Q}_{1,2}^{(b)}(Eu)}{5} \\
\text{z413} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(Eu, 1b) &= -\frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(Eg, 2)\mathbb{T}_{1,1}^{(b)}(Eu)}{12} + \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(Eg, 1)\mathbb{T}_1^{(b)}(Au)}{12} + \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(Eg, 2)\mathbb{T}_{1,2}^{(b)}(Eu)}{12} - \frac{\mathbb{M}_3^{(1,-1;a)}(Ag, 1)\mathbb{T}_{1,2}^{(b)}(Eu)}{2}
\end{aligned}$$

$$\begin{aligned}
\text{z414} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(Eu, 1b) &= -\frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(Eg, 1)\mathbb{T}_1^{(b)}(Au)}{12} + \frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(Eg, 2)\mathbb{T}_{1,2}^{(b)}(Eu)}{12} + \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(Eg, 2)\mathbb{T}_{1,1}^{(b)}(Eu)}{12} + \frac{\mathbb{M}_3^{(1,-1;a)}(Ag, 1)\mathbb{T}_{1,1}^{(b)}(Eu)}{2} \\
\text{z415} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(Eu, 2a) &= \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(1,-1;a)}(Eg, 1)\mathbb{Q}_{1,1}^{(b)}(Eu)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(1,-1;a)}(Eg, 1)\mathbb{Q}_{1,2}^{(b)}(Eu)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(1,-1;a)}(Eg, 2)\mathbb{Q}_1^{(b)}(Au)}{6} \\
\text{z416} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(Eu, 2a) &= -\frac{\sqrt{6}\mathbb{Q}_{2,1}^{(1,-1;a)}(Eg, 1)\mathbb{Q}_{1,2}^{(b)}(Eu)}{6} + \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(1,-1;a)}(Eg, 2)\mathbb{Q}_1^{(b)}(Au)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(1,-1;a)}(Eg, 1)\mathbb{Q}_{1,1}^{(b)}(Eu)}{6} \\
\text{z417} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(Eu, 2b) &= \frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(Eg, 1)\mathbb{T}_{1,1}^{(b)}(Eu)}{12} - \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(Eg, 1)\mathbb{T}_{1,2}^{(b)}(Eu)}{12} - \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(Eg, 2)\mathbb{T}_1^{(b)}(Au)}{6} + \frac{\mathbb{M}_3^{(1,-1;a)}(Ag, 2)\mathbb{T}_{1,2}^{(b)}(Eu)}{4} + \frac{\mathbb{M}_3^{(1,-1;a)}(Ag, 3)\mathbb{T}_{1,1}^{(b)}(Eu)}{4} \\
\text{z418} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(Eu, 2b) &= -\frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(Eg, 1)\mathbb{T}_{1,2}^{(b)}(Eu)}{12} + \frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(Eg, 2)\mathbb{T}_1^{(b)}(Au)}{6} - \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(Eg, 1)\mathbb{T}_{1,1}^{(b)}(Eu)}{12} - \frac{\mathbb{M}_3^{(1,-1;a)}(Ag, 2)\mathbb{T}_{1,1}^{(b)}(Eu)}{4} + \frac{\mathbb{M}_3^{(1,-1;a)}(Ag, 3)\mathbb{T}_{1,2}^{(b)}(Eu)}{4} \\
\text{z419} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(Eu, a) &= \frac{\mathbb{G}_{1,2}^{(1,0;a)}(Eg)\mathbb{Q}_1^{(b)}(Au)}{2} - \frac{\mathbb{G}_1^{(1,0;a)}(Ag)\mathbb{Q}_{1,2}^{(b)}(Eu)}{2} \\
\text{z420} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(Eu, a) &= -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(Eg)\mathbb{Q}_1^{(b)}(Au)}{2} + \frac{\mathbb{G}_1^{(1,0;a)}(Ag)\mathbb{Q}_{1,1}^{(b)}(Eu)}{2} \\
\text{z421} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(Eu, b) &= \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(Eg, 2)\mathbb{T}_{1,1}^{(b)}(Eu)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(Eg, 1)\mathbb{T}_1^{(b)}(Au)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(Eg, 2)\mathbb{T}_{1,2}^{(b)}(Eu)}{10} - \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(Ag)\mathbb{T}_{1,1}^{(b)}(Eu)}{10} \\
\text{z422} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(Eu, b) &= \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(Eg, 1)\mathbb{T}_1^{(b)}(Au)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(Eg, 2)\mathbb{T}_{1,2}^{(b)}(Eu)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(Eg, 2)\mathbb{T}_{1,1}^{(b)}(Eu)}{10} - \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(Ag)\mathbb{T}_{1,2}^{(b)}(Eu)}{10} \\
\text{z423} \quad \mathbb{Q}_{3,1}^{(1,0;c)}(Eu, 1) &= -\frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(Eg, 2)\mathbb{T}_{1,1}^{(b)}(Eu)}{30} - \frac{2\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(Eg, 1)\mathbb{T}_1^{(b)}(Au)}{15} + \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(Eg, 2)\mathbb{T}_{1,2}^{(b)}(Eu)}{30} + \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(Ag)\mathbb{T}_{1,1}^{(b)}(Eu)}{5} \\
\text{z424} \quad \mathbb{Q}_{3,2}^{(1,0;c)}(Eu, 1) &= \frac{2\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(Eg, 1)\mathbb{T}_1^{(b)}(Au)}{15} + \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(Eg, 2)\mathbb{T}_{1,2}^{(b)}(Eu)}{30} + \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(Eg, 2)\mathbb{T}_{1,1}^{(b)}(Eu)}{30} + \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(Ag)\mathbb{T}_{1,2}^{(b)}(Eu)}{5} \\
\text{z425} \quad \mathbb{Q}_{3,1}^{(1,0;c)}(Eu, 2) &= \frac{\sqrt{6}\mathbb{T}_{2,1}^{(1,0;a)}(Eg, 1)\mathbb{T}_{1,1}^{(b)}(Eu)}{6} - \frac{\sqrt{6}\mathbb{T}_{2,2}^{(1,0;a)}(Eg, 1)\mathbb{T}_{1,2}^{(b)}(Eu)}{6} - \frac{\sqrt{6}\mathbb{T}_{2,2}^{(1,0;a)}(Eg, 2)\mathbb{T}_1^{(b)}(Au)}{6} \\
\text{z426} \quad \mathbb{Q}_{3,2}^{(1,0;c)}(Eu, 2) &= -\frac{\sqrt{6}\mathbb{T}_{2,1}^{(1,0;a)}(Eg, 1)\mathbb{T}_{1,2}^{(b)}(Eu)}{6} + \frac{\sqrt{6}\mathbb{T}_{2,1}^{(1,0;a)}(Eg, 2)\mathbb{T}_1^{(b)}(Au)}{6} - \frac{\sqrt{6}\mathbb{T}_{2,2}^{(1,0;a)}(Eg, 1)\mathbb{T}_{1,1}^{(b)}(Eu)}{6} \\
\text{z427} \quad \mathbb{Q}_{1,1}^{(1,1;c)}(Eu, a) &= \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(Ag)\mathbb{Q}_{1,1}^{(b)}(Eu)}{2}
\end{aligned}$$

$$\begin{aligned}
\text{z428} \quad \mathbb{Q}_{1,2}^{(1,1;c)}(Eu, a) &= \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_g)\mathbb{Q}_{1,2}^{(b)}(Eu)}{2} \\
\text{z429} \quad \mathbb{Q}_{1,1}^{(1,1;c)}(Eu, b) &= \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E_g)\mathbb{T}_1^{(b)}(Au)}{2} - \frac{\mathbb{M}_1^{(1,1;a)}(A_g)\mathbb{T}_{1,2}^{(b)}(Eu)}{2} \\
\text{z430} \quad \mathbb{Q}_{1,2}^{(1,1;c)}(Eu, b) &= -\frac{\mathbb{M}_{1,1}^{(1,1;a)}(E_g)\mathbb{T}_1^{(b)}(Au)}{2} + \frac{\mathbb{M}_1^{(1,1;a)}(A_g)\mathbb{T}_{1,1}^{(b)}(Eu)}{2} \\
\text{z431} \quad \mathbb{G}_{2,1}^{(c)}(Eu, 1a) &= \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_{1,1}^{(b)}(Eu)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E_g, 1)\mathbb{Q}_1^{(b)}(Au)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_{1,2}^{(b)}(Eu)}{6} + \frac{\mathbb{Q}_2^{(a)}(A_g)\mathbb{Q}_{1,1}^{(b)}(Eu)}{2} \\
\text{z432} \quad \mathbb{G}_{2,2}^{(c)}(Eu, 1a) &= -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E_g, 1)\mathbb{Q}_1^{(b)}(Au)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_{1,2}^{(b)}(Eu)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_{1,1}^{(b)}(Eu)}{6} + \frac{\mathbb{Q}_2^{(a)}(A_g)\mathbb{Q}_{1,2}^{(b)}(Eu)}{2} \\
\text{z433} \quad \mathbb{G}_{2,1}^{(c)}(Eu, 1b) &= \frac{\mathbb{M}_{1,2}^{(a)}(E_g)\mathbb{T}_1^{(b)}(Au)}{2} + \frac{\mathbb{M}_1^{(a)}(A_g)\mathbb{T}_{1,2}^{(b)}(Eu)}{2} \\
\text{z434} \quad \mathbb{G}_{2,2}^{(c)}(Eu, 1b) &= -\frac{\mathbb{M}_{1,1}^{(a)}(E_g)\mathbb{T}_1^{(b)}(Au)}{2} - \frac{\mathbb{M}_1^{(a)}(A_g)\mathbb{T}_{1,1}^{(b)}(Eu)}{2} \\
\text{z435} \quad \mathbb{G}_{2,1}^{(c)}(Eu, 2a) &= -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E_g, 1)\mathbb{Q}_{1,1}^{(b)}(Eu)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E_g, 1)\mathbb{Q}_{1,2}^{(b)}(Eu)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E_g, 2)\mathbb{Q}_1^{(b)}(Au)}{3} \\
\text{z436} \quad \mathbb{G}_{2,2}^{(c)}(Eu, 2a) &= \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E_g, 1)\mathbb{Q}_{1,2}^{(b)}(Eu)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E_g, 2)\mathbb{Q}_1^{(b)}(Au)}{3} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E_g, 1)\mathbb{Q}_{1,1}^{(b)}(Eu)}{6} \\
\text{z437} \quad \mathbb{G}_{2,1}^{(c)}(Eu, 2b) &= \frac{\mathbb{M}_{1,1}^{(a)}(E_g)\mathbb{T}_{1,1}^{(b)}(Eu)}{2} - \frac{\mathbb{M}_{1,2}^{(a)}(E_g)\mathbb{T}_{1,2}^{(b)}(Eu)}{2} \\
\text{z438} \quad \mathbb{G}_{2,2}^{(c)}(Eu, 2b) &= -\frac{\mathbb{M}_{1,1}^{(a)}(E_g)\mathbb{T}_{1,2}^{(b)}(Eu)}{2} - \frac{\mathbb{M}_{1,2}^{(a)}(E_g)\mathbb{T}_{1,1}^{(b)}(Eu)}{2} \\
\text{z439} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(Eu, 1a) &= \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{1,1}^{(b)}(Eu)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_1^{(b)}(Au)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{1,2}^{(b)}(Eu)}{6} + \frac{\mathbb{Q}_2^{(1,-1;a)}(A_g)\mathbb{Q}_{1,1}^{(b)}(Eu)}{2} \\
\text{z440} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(Eu, 1a) &= -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_1^{(b)}(Au)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{1,2}^{(b)}(Eu)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_{1,1}^{(b)}(Eu)}{6} + \frac{\mathbb{Q}_2^{(1,-1;a)}(A_g)\mathbb{Q}_{1,2}^{(b)}(Eu)}{2} \\
\text{z441} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(Eu, 1b) &= \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{T}_1^{(b)}(Au)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(A_g)\mathbb{T}_{1,2}^{(b)}(Eu)}{2}
\end{aligned}$$

$$\begin{aligned}
\text{z442} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E_u, 1b) &= -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{T}_1^{(b)}(A_u)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(A_g)\mathbb{T}_{1,1}^{(b)}(E_u)}{2} \\
\text{z443} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E_u, 1c) &= \frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 2)\mathbb{T}_{1,1}^{(b)}(E_u)}{42} + \frac{2\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 1)\mathbb{T}_1^{(b)}(A_u)}{21} - \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 2)\mathbb{T}_{1,2}^{(b)}(E_u)}{42} - \frac{\sqrt{14}\mathbb{M}_3^{(1,-1;a)}(A_g, 1)\mathbb{T}_{1,2}^{(b)}(E_u)}{14} \\
\text{z444} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E_u, 1c) &= -\frac{2\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 1)\mathbb{T}_1^{(b)}(A_u)}{21} - \frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 2)\mathbb{T}_{1,2}^{(b)}(E_u)}{42} - \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 2)\mathbb{T}_{1,1}^{(b)}(E_u)}{42} + \frac{\sqrt{14}\mathbb{M}_3^{(1,-1;a)}(A_g, 1)\mathbb{T}_{1,1}^{(b)}(E_u)}{14} \\
\text{z445} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E_u, 2a) &= -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{1,1}^{(b)}(E_u)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{1,2}^{(b)}(E_u)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_1^{(b)}(A_u)}{3} \\
\text{z446} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E_u, 2a) &= \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{1,2}^{(b)}(E_u)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2)\mathbb{Q}_1^{(b)}(A_u)}{3} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 1)\mathbb{Q}_{1,1}^{(b)}(E_u)}{6} \\
\text{z447} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E_u, 2b) &= \frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{T}_{1,1}^{(b)}(E_u)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{T}_{1,2}^{(b)}(E_u)}{2} \\
\text{z448} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E_u, 2b) &= -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E_g)\mathbb{T}_{1,2}^{(b)}(E_u)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E_g)\mathbb{T}_{1,1}^{(b)}(E_u)}{2} \\
\text{z449} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E_u, 2c) &= -\frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 1)\mathbb{T}_{1,1}^{(b)}(E_u)}{42} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 1)\mathbb{T}_{1,2}^{(b)}(E_u)}{42} + \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 2)\mathbb{T}_1^{(b)}(A_u)}{42} \\
&\quad + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_g, 2)\mathbb{T}_{1,2}^{(b)}(E_u)}{14} + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_g, 3)\mathbb{T}_{1,1}^{(b)}(E_u)}{14} \\
\text{z450} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E_u, 2c) &= \frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 1)\mathbb{T}_{1,2}^{(b)}(E_u)}{42} - \frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 2)\mathbb{T}_1^{(b)}(A_u)}{42} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 1)\mathbb{T}_{1,1}^{(b)}(E_u)}{42} - \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_g, 2)\mathbb{T}_{1,1}^{(b)}(E_u)}{14} + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_g, 3)\mathbb{T}_{1,2}^{(b)}(E_u)}{14} \\
\text{z451} \quad \mathbb{G}_{4,1}^{(1,-1;c)}(E_u, 1) &= -\frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 2)\mathbb{T}_{1,1}^{(b)}(E_u)}{28} + \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 1)\mathbb{T}_1^{(b)}(A_u)}{28} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 2)\mathbb{T}_{1,2}^{(b)}(E_u)}{28} + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_g, 1)\mathbb{T}_{1,2}^{(b)}(E_u)}{14} \\
\text{z452} \quad \mathbb{G}_{4,2}^{(1,-1;c)}(E_u, 1) &= -\frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 1)\mathbb{T}_1^{(b)}(A_u)}{28} + \frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 2)\mathbb{T}_{1,2}^{(b)}(E_u)}{28} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 2)\mathbb{T}_{1,1}^{(b)}(E_u)}{28} - \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_g, 1)\mathbb{T}_{1,1}^{(b)}(E_u)}{14} \\
\text{z453} \quad \mathbb{G}_{4,1}^{(1,-1;c)}(E_u, 2) &= -\frac{\mathbb{M}_3^{(1,-1;a)}(A_g, 2)\mathbb{T}_{1,2}^{(b)}(E_u)}{2} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_g, 3)\mathbb{T}_{1,1}^{(b)}(E_u)}{2} \\
\text{z454} \quad \mathbb{G}_{4,2}^{(1,-1;c)}(E_u, 2) &= \frac{\mathbb{M}_3^{(1,-1;a)}(A_g, 2)\mathbb{T}_{1,1}^{(b)}(E_u)}{2} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_g, 3)\mathbb{T}_{1,2}^{(b)}(E_u)}{2}
\end{aligned}$$

$$\begin{aligned}
\text{z455} \quad \mathbb{G}_{4,1}^{(1,-1;c)}(Eu, 3) &= \frac{\sqrt{105}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 1)\mathbb{T}_{1,1}^{(b)}(Eu)}{28} - \frac{\sqrt{105}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 1)\mathbb{T}_{1,2}^{(b)}(Eu)}{28} + \frac{\sqrt{42}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 2)\mathbb{T}_1^{(b)}(Au)}{14} - \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_g, 2)\mathbb{T}_{1,2}^{(b)}(Eu)}{28} - \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_g, 3)\mathbb{T}_{1,1}^{(b)}(Eu)}{28} \\
\text{z456} \quad \mathbb{G}_{4,2}^{(1,-1;c)}(Eu, 3) &= -\frac{\sqrt{105}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 1)\mathbb{T}_{1,2}^{(b)}(Eu)}{28} - \frac{\sqrt{42}\mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 2)\mathbb{T}_1^{(b)}(Au)}{14} - \frac{\sqrt{105}\mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 1)\mathbb{T}_{1,1}^{(b)}(Eu)}{28} + \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_g, 2)\mathbb{T}_{1,1}^{(b)}(Eu)}{28} - \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_g, 3)\mathbb{T}_{1,2}^{(b)}(Eu)}{28} \\
\text{z457} \quad \mathbb{G}_{2,1}^{(1,0;c)}(Eu, 1a) &= \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E_g)\mathbb{Q}_1^{(b)}(Au)}{2} + \frac{\mathbb{G}_1^{(1,0;a)}(A_g)\mathbb{Q}_{1,2}^{(b)}(Eu)}{2} \\
\text{z458} \quad \mathbb{G}_{2,2}^{(1,0;c)}(Eu, 1a) &= -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E_g)\mathbb{Q}_1^{(b)}(Au)}{2} - \frac{\mathbb{G}_1^{(1,0;a)}(A_g)\mathbb{Q}_{1,1}^{(b)}(Eu)}{2} \\
\text{z459} \quad \mathbb{G}_{2,1}^{(1,0;c)}(Eu, 1b) &= \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 2)\mathbb{T}_{1,1}^{(b)}(Eu)}{6} + \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 1)\mathbb{T}_1^{(b)}(Au)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 2)\mathbb{T}_{1,2}^{(b)}(Eu)}{6} + \frac{\mathbb{T}_2^{(1,0;a)}(A_g)\mathbb{T}_{1,1}^{(b)}(Eu)}{2} \\
\text{z460} \quad \mathbb{G}_{2,2}^{(1,0;c)}(Eu, 1b) &= -\frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 1)\mathbb{T}_1^{(b)}(Au)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 2)\mathbb{T}_{1,2}^{(b)}(Eu)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 2)\mathbb{T}_{1,1}^{(b)}(Eu)}{6} + \frac{\mathbb{T}_2^{(1,0;a)}(A_g)\mathbb{T}_{1,2}^{(b)}(Eu)}{2} \\
\text{z461} \quad \mathbb{G}_{2,1}^{(1,0;c)}(Eu, 2a) &= \frac{\mathbb{G}_{1,1}^{(1,0;a)}(E_g)\mathbb{Q}_{1,1}^{(b)}(Eu)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E_g)\mathbb{Q}_{1,2}^{(b)}(Eu)}{2} \\
\text{z462} \quad \mathbb{G}_{2,2}^{(1,0;c)}(Eu, 2a) &= -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E_g)\mathbb{Q}_{1,2}^{(b)}(Eu)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E_g)\mathbb{Q}_{1,1}^{(b)}(Eu)}{2} \\
\text{z463} \quad \mathbb{G}_{2,1}^{(1,0;c)}(Eu, 2b) &= -\frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 1)\mathbb{T}_{1,1}^{(b)}(Eu)}{6} + \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 1)\mathbb{T}_{1,2}^{(b)}(Eu)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 2)\mathbb{T}_1^{(b)}(Au)}{3} \\
\text{z464} \quad \mathbb{G}_{2,2}^{(1,0;c)}(Eu, 2b) &= \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 1)\mathbb{T}_{1,2}^{(b)}(Eu)}{6} + \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E_g, 2)\mathbb{T}_1^{(b)}(Au)}{3} + \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E_g, 1)\mathbb{T}_{1,1}^{(b)}(Eu)}{6} \\
\text{z465} \quad \mathbb{G}_{2,1}^{(1,1;c)}(Eu, 1) &= \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E_g)\mathbb{T}_1^{(b)}(Au)}{2} + \frac{\mathbb{M}_1^{(1,1;a)}(A_g)\mathbb{T}_{1,2}^{(b)}(Eu)}{2} \\
\text{z466} \quad \mathbb{G}_{2,2}^{(1,1;c)}(Eu, 1) &= -\frac{\mathbb{M}_{1,1}^{(1,1;a)}(E_g)\mathbb{T}_1^{(b)}(Au)}{2} - \frac{\mathbb{M}_1^{(1,1;a)}(A_g)\mathbb{T}_{1,1}^{(b)}(Eu)}{2} \\
\text{z467} \quad \mathbb{G}_{2,1}^{(1,1;c)}(Eu, 2) &= \frac{\mathbb{M}_{1,1}^{(1,1;a)}(E_g)\mathbb{T}_{1,1}^{(b)}(Eu)}{2} - \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E_g)\mathbb{T}_{1,2}^{(b)}(Eu)}{2} \\
\text{z468} \quad \mathbb{G}_{2,2}^{(1,1;c)}(Eu, 2) &= -\frac{\mathbb{M}_{1,1}^{(1,1;a)}(E_g)\mathbb{T}_{1,2}^{(b)}(Eu)}{2} - \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E_g)\mathbb{T}_{1,1}^{(b)}(Eu)}{2}
\end{aligned}$$

- bra:  $\langle s, \uparrow |, \langle s, \downarrow |$
- ket:  $|s, \uparrow\rangle, |s, \downarrow\rangle$

$$\boxed{\text{x1}} \quad \mathbb{Q}_0^{(a)}(A_g) = \begin{bmatrix} \frac{\sqrt{2}}{2} & 0 \\ 0 & \frac{\sqrt{2}}{2} \end{bmatrix}$$

$$\boxed{\text{x2}} \quad \mathbb{M}_1^{(1,-1;a)}(A_g) = \begin{bmatrix} \frac{\sqrt{2}}{2} & 0 \\ 0 & -\frac{\sqrt{2}}{2} \end{bmatrix}$$

$$\boxed{\text{x3}} \quad \mathbb{M}_{1,1}^{(1,-1;a)}(E_g) = \begin{bmatrix} 0 & \frac{\sqrt{2}}{2} \\ \frac{\sqrt{2}}{2} & 0 \end{bmatrix}$$

$$\boxed{\text{x4}} \quad \mathbb{M}_{1,2}^{(1,-1;a)}(E_g) = \begin{bmatrix} 0 & -\frac{\sqrt{2}i}{2} \\ \frac{\sqrt{2}i}{2} & 0 \end{bmatrix}$$

- bra:  $\langle s, \uparrow |, \langle s, \downarrow |$
- ket:  $|p_x, \uparrow\rangle, |p_x, \downarrow\rangle, |p_y, \uparrow\rangle, |p_y, \downarrow\rangle, |p_z, \uparrow\rangle, |p_z, \downarrow\rangle$

$$\boxed{\text{x5}} \quad \mathbb{Q}_1^{(a)}(A_u) = \begin{bmatrix} 0 & 0 & 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \end{bmatrix}$$

$$\boxed{\text{x6}} \quad \mathbb{Q}_{1,1}^{(a)}(E_u) = \begin{bmatrix} \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x7}} \quad \mathbb{Q}_{1,2}^{(a)}(E_u) = \begin{bmatrix} 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{2} & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x8}} \quad \mathbb{Q}_1^{(1,0;a)}(A_u) = \begin{bmatrix} 0 & -\frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x9}} \quad \mathbb{Q}_{1,1}^{(1,0;a)}(E_u) = \begin{bmatrix} 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & -\frac{\sqrt{2}}{4} & 0 \end{bmatrix}$$

$$\boxed{\text{x10}} \quad \mathbb{Q}_{1,2}^{(1,0;a)}(E_u) = \begin{bmatrix} \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \end{bmatrix}$$



$$\boxed{\text{x11}} \quad \mathbb{G}_2^{(1,-1;a)}(A_u) = \begin{bmatrix} 0 & -\frac{\sqrt{6}i}{12} & 0 & -\frac{\sqrt{6}}{12} & \frac{\sqrt{6}i}{6} & 0 \\ -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}i}{6} \end{bmatrix}$$

$$\boxed{\text{x12}} \quad \mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 1) = \begin{bmatrix} 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & -\frac{\sqrt{2}}{4} & 0 \end{bmatrix}$$

$$\boxed{\text{x13}} \quad \mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 1) = \begin{bmatrix} -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \end{bmatrix}$$

$$\boxed{\text{x14}} \quad \mathbb{G}_{2,1}^{(1,-1;a)}(E_u, 2) = \begin{bmatrix} 0 & \frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x15}} \quad \mathbb{G}_{2,2}^{(1,-1;a)}(E_u, 2) = \begin{bmatrix} 0 & -\frac{\sqrt{2}}{4} & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x16}} \quad \mathbb{G}_0^{(1,1;a)}(A_u) = \begin{bmatrix} 0 & \frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & \frac{\sqrt{3}i}{6} & 0 \\ \frac{\sqrt{3}i}{6} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} \end{bmatrix}$$

$$\boxed{\text{x17}} \quad \mathbb{M}_2^{(1,-1;a)}(A_u) = \begin{bmatrix} 0 & -\frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}i}{12} & \frac{\sqrt{6}}{6} & 0 \\ -\frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & -\frac{\sqrt{6}}{6} \end{bmatrix}$$

$$\boxed{\text{x18}} \quad \mathbb{M}_{2,1}^{(1,-1;a)}(E_u, 1) = \begin{bmatrix} 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & \frac{\sqrt{2}i}{4} & 0 \end{bmatrix}$$

$$\boxed{\text{x19}} \quad \mathbb{M}_{2,2}^{(1,-1;a)}(E_u, 1) = \begin{bmatrix} -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \end{bmatrix}$$

$$\boxed{\text{x20}} \quad \mathbb{M}_{2,1}^{(1,-1;a)}(E_u, 2) = \begin{bmatrix} 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x21}} \quad \mathbb{M}_{2,2}^{(1,-1;a)}(E_u, 2) = \begin{bmatrix} 0 & \frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x22}} \quad \mathbb{M}_0^{(1,1;a)}(A_u) = \begin{bmatrix} 0 & \frac{\sqrt{3}}{6} & 0 & -\frac{\sqrt{3}i}{6} & \frac{\sqrt{3}}{6} & 0 \\ \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & -\frac{\sqrt{3}}{6} \end{bmatrix}$$

$$\boxed{\text{x23}} \quad \mathbb{T}_1^{(a)}(A_u) = \begin{bmatrix} 0 & 0 & 0 & 0 & \frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{i}{2} \end{bmatrix}$$

$$\boxed{\text{x24}} \quad \mathbb{T}_{1,1}^{(a)}(E_u) = \begin{bmatrix} \frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x25}} \quad \mathbb{T}_{1,2}^{(a)}(E_u) = \begin{bmatrix} 0 & 0 & \frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{2} & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x26}} \quad \mathbb{T}_1^{(1,0;a)}(A_u) = \begin{bmatrix} 0 & \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x27}} \quad \mathbb{T}_{1,1}^{(1,0;a)}(E_u) = \begin{bmatrix} 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & \frac{\sqrt{2}}{4} & \frac{\sqrt{2}i}{4} & 0 \end{bmatrix}$$

$$\boxed{\text{x28}} \quad \mathbb{T}_{1,2}^{(1,0;a)}(E_u) = \begin{bmatrix} \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \end{bmatrix}$$

- bra:  $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$
- ket:  $|p_x, \uparrow \rangle, |p_x, \downarrow \rangle, |p_y, \uparrow \rangle, |p_y, \downarrow \rangle, |p_z, \uparrow \rangle, |p_z, \downarrow \rangle$

$$\boxed{\text{x29}} \quad \mathbb{Q}_0^{(a)}(A_g) = \begin{bmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} \end{bmatrix}$$

$$\boxed{\text{x30}} \quad \mathbb{Q}_2^{(a)}(A_g) = \begin{bmatrix} -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{3} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{3} \end{bmatrix}$$

$$\boxed{\text{x31}} \quad \mathbb{Q}_{2,1}^{(a)}(E_g, 1) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{2} & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x32}} \quad \mathbb{Q}_{2,2}^{(a)}(E_g, 1) = \begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{1}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{1}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x33}} \quad \mathbb{Q}_{2,1}^{(a)}(E_g, 2) = \begin{bmatrix} \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{2} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x34}} \quad \mathbb{Q}_{2,2}^{(a)}(E_g, 2) = \begin{bmatrix} 0 & 0 & -\frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{2} & 0 & 0 \\ -\frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{1}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x35}} \quad \mathbb{Q}_2^{(1,-1;a)}(A_g) = \begin{bmatrix} 0 & 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & 0 & 0 & \frac{\sqrt{6}i}{6} & \frac{\sqrt{6}}{12} & 0 \\ \frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{12} \\ 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & \frac{\sqrt{6}i}{12} & 0 \\ 0 & \frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 \\ -\frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x36}} \quad \mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 1) = \begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & \frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x37}} \quad \mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 1) = \begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x38}} \quad \mathbb{Q}_{2,1}^{(1,-1;a)}(E_g, 2) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x39}} \quad \mathbb{Q}_{2,2}^{(1,-1;a)}(E_g, 2) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x40}} \quad \mathbb{Q}_0^{(1,1;a)}(A_g) = \begin{bmatrix} 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}}{6} & 0 \\ \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 \\ 0 & -\frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 \\ \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x41}} \quad \mathbb{G}_1^{(1,0;a)}(A_g) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x42}} \quad \mathbb{G}_{1,1}^{(1,0;a)}(E_g) = \begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x43}} \quad \mathbb{G}_{1,2}^{(1,0;a)}(E_g) = \begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x44}} \quad \mathbb{M}_1^{(a)}(A_g) = \begin{bmatrix} 0 & 0 & -\frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{i}{2} & 0 & 0 \\ \frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x45}} \quad \mathbb{M}_{1,1}^{(a)}(E_g) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{i}{2} \\ 0 & 0 & \frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{2} & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x46}} \quad \mathbb{M}_{1,2}^{(a)}(E_g) = \begin{bmatrix} 0 & 0 & 0 & 0 & \frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{i}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{i}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x47}} \quad \mathbb{M}_1^{(1,-1;a)}(A_g) = \begin{bmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{6} \end{bmatrix}$$

$$\boxed{\text{x48}} \quad \mathbb{M}_3^{(1,-1;a)}(A_g, 1) = \begin{bmatrix} -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} \\ 0 & \frac{\sqrt{5}}{10} & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 \\ 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{5}i}{10} \\ 0 & 0 & 0 & \frac{\sqrt{5}}{10} & -\frac{\sqrt{5}i}{10} & 0 \\ 0 & -\frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{5}i}{10} & \frac{\sqrt{5}}{5} & 0 \\ -\frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & -\frac{\sqrt{5}}{5} \end{bmatrix}$$

$$\boxed{\text{x49}} \quad \mathbb{M}_3^{(1,-1;a)}(A_g, 2) = \begin{bmatrix} 0 & -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x50}} \quad \mathbb{M}_3^{(1,-1;a)}(A_g, 3) = \begin{bmatrix} 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x51}} \quad \mathbb{M}_{1,1}^{(1,-1;a)}(E_g) = \begin{bmatrix} 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \end{bmatrix}$$

$$\boxed{\text{x52}} \quad \mathbb{M}_{1,2}^{(1,-1;a)}(E_g) = \begin{bmatrix} 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}i}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{6} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{6} & 0 \end{bmatrix}$$

$$\boxed{\text{x53}} \quad \mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 1) = \begin{bmatrix} 0 & -\frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{60} & \frac{\sqrt{30}}{15} & 0 \\ -\frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{30}i}{60} & 0 & 0 & -\frac{\sqrt{30}}{15} \\ 0 & \frac{\sqrt{30}i}{60} & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 \\ -\frac{\sqrt{30}i}{60} & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 & 0 \\ \frac{\sqrt{30}}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{15} \\ 0 & -\frac{\sqrt{30}}{15} & 0 & 0 & \frac{\sqrt{30}}{15} & 0 \end{bmatrix}$$

$$\boxed{\text{x54}} \quad \mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 1) = \begin{bmatrix} 0 & \frac{\sqrt{30}i}{60} & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 \\ -\frac{\sqrt{30}i}{60} & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{30}}{60} & 0 & \frac{\sqrt{30}i}{20} & \frac{\sqrt{30}}{15} & 0 \\ -\frac{\sqrt{30}}{60} & 0 & -\frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{30}}{15} \\ 0 & 0 & \frac{\sqrt{30}}{15} & 0 & 0 & -\frac{\sqrt{30}i}{15} \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{15} & \frac{\sqrt{30}i}{15} & 0 \end{bmatrix}$$

$$\boxed{\text{x55}} \quad \mathbb{M}_{3,1}^{(1,-1;a)}(E_g, 2) = \begin{bmatrix} 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & \frac{\sqrt{3}i}{6} & 0 \\ \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 \\ \frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x56}} \quad \mathbb{M}_{3,2}^{(1,-1;a)}(E_g, 2) = \begin{bmatrix} \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}i}{6} \\ 0 & 0 & 0 & \frac{\sqrt{3}}{6} & -\frac{\sqrt{3}i}{6} & 0 \\ 0 & \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 \\ \frac{\sqrt{3}}{6} & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x57}} \quad \mathbb{M}_1^{(1,1;a)}(A_g) = \begin{bmatrix} -\frac{\sqrt{30}}{30} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} \\ 0 & \frac{\sqrt{30}}{30} & 0 & 0 & \frac{\sqrt{30}}{20} & 0 \\ 0 & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 & -\frac{\sqrt{30}i}{20} \\ 0 & 0 & 0 & \frac{\sqrt{30}}{30} & \frac{\sqrt{30}i}{20} & 0 \\ 0 & \frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{30}i}{20} & \frac{\sqrt{30}}{15} & 0 \\ \frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{30}}{15} \end{bmatrix}$$

$$\boxed{\text{x58}} \quad \mathbb{M}_{1,1}^{(1,1;a)}(E_g) = \begin{bmatrix} 0 & \frac{\sqrt{30}}{15} & 0 & -\frac{\sqrt{30}i}{20} & \frac{\sqrt{30}}{20} & 0 \\ \frac{\sqrt{30}}{15} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{30}}{20} \\ 0 & -\frac{\sqrt{30}i}{20} & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 \\ \frac{\sqrt{30}i}{20} & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 & 0 \\ \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{30} \\ 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & -\frac{\sqrt{30}}{30} & 0 \end{bmatrix}$$

$$\boxed{\text{x59}} \quad \mathbb{M}_{1,2}^{(1,1;a)}(E_g) = \begin{bmatrix} 0 & \frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{20} & 0 & 0 \\ -\frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{30}i}{15} & \frac{\sqrt{30}}{20} & 0 \\ \frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{15} & 0 & 0 & -\frac{\sqrt{30}}{20} \\ 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & \frac{\sqrt{30}i}{30} \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{20} & -\frac{\sqrt{30}i}{30} & 0 \end{bmatrix}$$

$$\boxed{\text{x60}} \quad \mathbb{T}_2^{(1,0;a)}(A_g) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x61}} \quad \mathbb{T}_{2,1}^{(1,0;a)}(E_g, 1) = \begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{6}i}{12} & \frac{\sqrt{6}}{12} & 0 \\ 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & \frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{6} \\ 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}}{6} & 0 \end{bmatrix}$$

$$\boxed{\text{x62}} \quad \mathbb{T}_{2,2}^{(1,0;a)}(E_g, 1) = \begin{bmatrix} 0 & -\frac{\sqrt{6}i}{6} & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 \\ \frac{\sqrt{6}i}{6} & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & \frac{\sqrt{6}}{12} & 0 \\ -\frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & \frac{\sqrt{6}i}{6} \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{12} & -\frac{\sqrt{6}i}{6} & 0 \end{bmatrix}$$

$$\boxed{\text{x63}} \quad \mathbb{T}_{2,1}^{(1,0;a)}(E_g, 2) = \begin{bmatrix} 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{6}i}{12} \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}i}{12} & 0 \\ -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & \frac{\sqrt{6}}{12} & 0 \\ 0 & -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 \\ \frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 \end{bmatrix}$$



$$\boxed{\text{x64}} \quad \mathbb{T}_{2,2}^{(1,0;a)}(E_g, 2) = \begin{bmatrix} -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & \frac{\sqrt{6}}{12} & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & \frac{\sqrt{6}i}{12} \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{6} & -\frac{\sqrt{6}i}{12} & 0 \\ 0 & \frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 \\ \frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 \end{bmatrix}$$

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### Cluster SAMB

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- Site cluster

\*\* Wyckoff: **3e**

$$\boxed{\text{y1}} \quad \mathbb{Q}_0^{(s)}(A_g) = \left[ \frac{\sqrt{3}}{3}, \frac{\sqrt{3}}{3}, \frac{\sqrt{3}}{3} \right]$$

$$\boxed{\text{y2}} \quad \mathbb{Q}_{2,1}^{(s)}(E_g, 1) = \left[ \frac{\sqrt{14}}{14}, \frac{\sqrt{14}}{7}, -\frac{3\sqrt{14}}{14} \right]$$

$$\boxed{\text{y3}} \quad \mathbb{Q}_{2,2}^{(s)}(E_g, 1) = \left[ -\frac{5\sqrt{42}}{42}, \frac{2\sqrt{42}}{21}, \frac{\sqrt{42}}{42} \right]$$

- Bond cluster

\*\* Wyckoff: **6a@6g**

$$\boxed{\text{y4}} \quad \mathbb{Q}_0^{(s)}(A_g) = \left[ \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6} \right]$$

$$\boxed{\text{y5}} \quad \mathbb{T}_0^{(s)}(A_g) = \left[ \frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6} \right]$$

$$\boxed{\text{y6}} \quad \mathbb{Q}_1^{(s)}(A_u) = \left[ \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, -\frac{\sqrt{6}}{6}, -\frac{\sqrt{6}}{6}, -\frac{\sqrt{6}}{6} \right]$$

$$\boxed{\text{y7}} \quad \mathbb{T}_1^{(s)}(A_u) = \left[ \frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6}, -\frac{\sqrt{6}i}{6}, -\frac{\sqrt{6}i}{6}, -\frac{\sqrt{6}i}{6} \right]$$

$$\boxed{\text{y8}} \quad \mathbb{M}_{1,1}^{(s)}(E_g) = \left[ \frac{\sqrt{7}i}{14}, \frac{\sqrt{7}i}{7}, -\frac{3\sqrt{7}i}{14}, \frac{\sqrt{7}i}{14}, \frac{\sqrt{7}i}{7}, -\frac{3\sqrt{7}i}{14} \right]$$

$$\boxed{\text{y9}} \quad \mathbb{M}_{1,2}^{(s)}(E_g) = \left[ -\frac{5\sqrt{21}i}{42}, \frac{2\sqrt{21}i}{21}, \frac{\sqrt{21}i}{42}, -\frac{5\sqrt{21}i}{42}, \frac{2\sqrt{21}i}{21}, \frac{\sqrt{21}i}{42} \right]$$

$$\boxed{\text{y10}} \quad \mathbb{Q}_{2,1}^{(s)}(E_g, 1) = \left[ \frac{\sqrt{7}}{14}, \frac{\sqrt{7}}{7}, -\frac{3\sqrt{7}}{14}, \frac{\sqrt{7}}{14}, \frac{\sqrt{7}}{7}, -\frac{3\sqrt{7}}{14} \right]$$

$$\boxed{\text{y11}} \quad \mathbb{Q}_{2,2}^{(s)}(E_g, 1) = \left[ -\frac{5\sqrt{21}}{42}, \frac{2\sqrt{21}}{21}, \frac{\sqrt{21}}{42}, -\frac{5\sqrt{21}}{42}, \frac{2\sqrt{21}}{21}, \frac{\sqrt{21}}{42} \right]$$

$$\boxed{\text{y12}} \quad \mathbb{Q}_{1,1}^{(s)}(E_u) = \left[ \frac{5\sqrt{21}}{42}, -\frac{2\sqrt{21}}{21}, -\frac{\sqrt{21}}{42}, -\frac{5\sqrt{21}}{42}, \frac{2\sqrt{21}}{21}, \frac{\sqrt{21}}{42} \right]$$

$$\boxed{\text{y13}} \quad \mathbb{Q}_{1,2}^{(s)}(E_u) = \left[ \frac{\sqrt{7}}{14}, \frac{\sqrt{7}}{7}, -\frac{3\sqrt{7}}{14}, -\frac{\sqrt{7}}{14}, -\frac{\sqrt{7}}{7}, \frac{3\sqrt{7}}{14} \right]$$

$$\boxed{\text{y14}} \quad \mathbb{T}_{1,1}^{(s)}(E_u) = \left[ \frac{5\sqrt{21}i}{42}, -\frac{2\sqrt{21}i}{21}, -\frac{\sqrt{21}i}{42}, -\frac{5\sqrt{21}i}{42}, \frac{2\sqrt{21}i}{21}, \frac{\sqrt{21}i}{42} \right]$$

$$\boxed{\text{y15}} \quad \mathbb{T}_{1,2}^{(s)}(E_u) = \left[ \frac{\sqrt{7}i}{14}, \frac{\sqrt{7}i}{7}, -\frac{3\sqrt{7}i}{14}, -\frac{\sqrt{7}i}{14}, -\frac{\sqrt{7}i}{7}, \frac{3\sqrt{7}i}{14} \right]$$

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## Site and Bond

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Table 5: Orbital of each site

#	site	orbital
1	<b>A</b>	$ s, \uparrow\rangle,  s, \downarrow\rangle,  p_x, \uparrow\rangle,  p_x, \downarrow\rangle,  p_y, \uparrow\rangle,  p_y, \downarrow\rangle,  p_z, \uparrow\rangle,  p_z, \downarrow\rangle$

Table 6: Neighbor and bra-ket of each bond

#	head	tail	neighbor	head (bra)	tail (ket)
1	A	A	[1]	[s,p]	[s,p]

### Site in Unit Cell

Sites in (conventional) cell (no plus set), SL = sublattice

Table 7: 'A' (#1) site cluster (3e), -1

SL	position ( $\mathbf{s}$ )	mapping
1	[ 0.50000, 0.00000, 0.00000]	[1,4]
2	[ 0.00000, 0.50000, 0.00000]	[2,5]
3	[ 0.50000, 0.50000, 0.00000]	[3,6]

### Bond in Unit Cell

Bonds in (conventional) cell (no plus set): tail, head = (SL, plus set), (N)D = (non)directional (listed up to 5th neighbor at most)

Table 8: 1-th ' $\mathbf{A}^1\text{-}\mathbf{A}^1$ ' [1] (#1) bond cluster (6a06g), D,  $|\mathbf{v}|=0.5$  (cartesian)

SL	vector ( $\mathbf{v}$ )	center ( $\mathbf{c}$ )	mapping	head	tail	$\mathbf{R}$ (primitive)
1	[-0.50000, -0.50000, 0.00000]	[ 0.25000, 0.75000, 0.00000]	[1]	(2,1)	(1,1)	[0,1,0]
2	[ 0.50000, 0.00000, 0.00000]	[ 0.25000, 0.50000, 0.00000]	[2]	(3,1)	(2,1)	[0,0,0]
3	[ 0.00000, 0.50000, 0.00000]	[ 0.50000, 0.75000, 0.00000]	[3]	(1,1)	(3,1)	[0,-1,0]
4	[ 0.50000, 0.50000, 0.00000]	[ 0.75000, 0.25000, 0.00000]	[4]	(2,1)	(1,1)	[-1,0,0]
5	[-0.50000, 0.00000, 0.00000]	[ 0.75000, 0.50000, 0.00000]	[5]	(3,1)	(2,1)	[1,0,0]
6	[ 0.00000, -0.50000, 0.00000]	[ 0.50000, 0.25000, 0.00000]	[6]	(1,1)	(3,1)	[0,0,0]