SAMB for "`Mn3Sn`"

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- Group: No. 194 D_{6h}^4 $P6_3/mmc$ [hexagonal]
- Associated point group: No. 27 D_{6h} $6/mmm$ [hexagonal]

- Generation condition
    - model type: `tight_binding`
    - time-reversal type: `electric`
    - irrep: `[A1g]`
    - `spinless`

- Unit cell:
    $a = 1.0,\ b = 1.0,\ c = 1.0,\ \alpha = 90.0,\ \beta = 90.0,\ \gamma = 120.0$
- Lattice vectors:
    $\boldsymbol{a}_1 = \begin{pmatrix} 1.0 & 0 & 0 \end{pmatrix}$
    $\boldsymbol{a}_2 = \begin{pmatrix} -0.5 & 0.86602540378444 & 0 \end{pmatrix}$
    $\boldsymbol{a}_3 = \begin{pmatrix} 0 & 0 & 1.0 \end{pmatrix}$

Table 1: High-symmetry line: Γ-X.

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

- Kets: dimension = 40

1

Table 2: Hilbert space for full matrix.

No.	ket	No.	ket	No.	ket	No.	ket	No.	ket
1	d_u@Mn$_1$	2	d_v@Mn$_1$	3	d_{yz}@Mn$_1$	4	d_{zx}@Mn$_1$	5	d_{xy}@Mn$_1$
6	d_u@Mn$_2$	7	d_v@Mn$_2$	8	d_{yz}@Mn$_2$	9	d_{zx}@Mn$_2$	10	d_{xy}@Mn$_2$
11	d_u@Mn$_3$	12	d_v@Mn$_3$	13	d_{yz}@Mn$_3$	14	d_{zx}@Mn$_3$	15	d_{xy}@Mn$_3$
16	d_u@Mn$_4$	17	d_v@Mn$_4$	18	d_{yz}@Mn$_4$	19	d_{zx}@Mn$_4$	20	d_{xy}@Mn$_4$
21	d_u@Mn$_5$	22	d_v@Mn$_5$	23	d_{yz}@Mn$_5$	24	d_{zx}@Mn$_5$	25	d_{xy}@Mn$_5$
26	d_u@Mn$_6$	27	d_v@Mn$_6$	28	d_{yz}@Mn$_6$	29	d_{zx}@Mn$_6$	30	d_{xy}@Mn$_6$
31	d_u@Sn$_1$	32	d_v@Sn$_1$	33	d_{yz}@Sn$_1$	34	d_{zx}@Sn$_1$	35	d_{xy}@Sn$_1$
36	d_u@Sn$_2$	37	d_v@Sn$_2$	38	d_{yz}@Sn$_2$	39	d_{zx}@Sn$_2$	40	d_{xy}@Sn$_2$

- Sites in (primitive) unit cell:

Table 3: Site-clusters.

	site	position			mapping
S$_1$ [6h: mm2]	Mn$_1$	0.8388	0.6776	$\frac{1}{4}$	[1,6,14,17]
	Mn$_2$	0.1612	0.3224	$\frac{3}{4}$	[2,3,13,18]
	Mn$_3$	0.1612	0.8388	$\frac{3}{4}$	[4,11,19,22]
	Mn$_4$	0.6776	0.8388	$\frac{3}{4}$	[5,12,20,21]
	Mn$_5$	0.8388	0.1612	$\frac{1}{4}$	[7,10,15,23]
	Mn$_6$	0.3224	0.1612	$\frac{1}{4}$	[8,9,16,24]
S$_2$ [2c: -6m2]	Sn$_1$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{4}$	[1,6,7,8,9,10,14,15,16,17,23,24]
	Sn$_2$	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{3}{4}$	[2,3,4,5,11,12,13,18,19,20,21,22]

- Bonds in (primitive) unit cell:

2

Table 4: Bond-clusters.

	bond	tail	head	n	#	$\boldsymbol{b}@\boldsymbol{c}$	mapping
B$_1$ [6h: mm2]	b$_1$	Mn$_5$	Mn$_1$	1	1	$\begin{pmatrix}0 & 0.4836 & 0\end{pmatrix}$ @ $\begin{pmatrix}0.8388 & 0.9194 & \frac{1}{4}\end{pmatrix}$	[1,-7,-15,17]
	b$_2$	Mn$_3$	Mn$_2$	1	1	$\begin{pmatrix}0 & -0.4836 & 0\end{pmatrix}$ @ $\begin{pmatrix}0.1612 & 0.0806 & \frac{3}{4}\end{pmatrix}$	[2,-4,13,-19]
	b$_3$	Mn$_4$	Mn$_2$	1	1	$\begin{pmatrix}-0.4836 & -0.4836 & 0\end{pmatrix}$ @ $\begin{pmatrix}0.9194 & 0.0806 & \frac{3}{4}\end{pmatrix}$	[3,-12,18,-21]
	b$_4$	Mn$_4$	Mn$_3$	1	1	$\begin{pmatrix}-0.4836 & 0 & 0\end{pmatrix}$ @ $\begin{pmatrix}0.9194 & 0.8388 & \frac{3}{4}\end{pmatrix}$	[-5,11,-20,22]
	b$_5$	Mn$_6$	Mn$_1$	1	1	$\begin{pmatrix}0.4836 & 0.4836 & 0\end{pmatrix}$ @ $\begin{pmatrix}0.0806 & 0.9194 & \frac{1}{4}\end{pmatrix}$	[6,-9,14,-24]
	b$_6$	Mn$_6$	Mn$_5$	1	1	$\begin{pmatrix}0.4836 & 0 & 0\end{pmatrix}$ @ $\begin{pmatrix}0.0806 & 0.1612 & \frac{1}{4}\end{pmatrix}$	[-8,10,-16,23]
B$_2$ [6g: .2/m.]	b$_7$	Sn$_2$	Sn$_1$	1	1	$\begin{pmatrix}\frac{1}{3} & \frac{2}{3} & -\frac{1}{2}\end{pmatrix}$ @ $\begin{pmatrix}\frac{1}{2} & 0 & 0\end{pmatrix}$	[1,-3,-13,14]
	b$_8$	Sn$_2$	Sn$_1$	1	1	$\begin{pmatrix}\frac{1}{3} & \frac{2}{3} & \frac{1}{2}\end{pmatrix}$ @ $\begin{pmatrix}\frac{1}{2} & 0 & \frac{1}{2}\end{pmatrix}$	[-2,6,17,-18]
	b$_9$	Sn$_2$	Sn$_1$	1	1	$\begin{pmatrix}\frac{1}{3} & -\frac{1}{3} & -\frac{1}{2}\end{pmatrix}$ @ $\begin{pmatrix}\frac{1}{2} & \frac{1}{2} & 0\end{pmatrix}$	[-4,10,15,-22]
	b$_{10}$	Sn$_2$	Sn$_1$	1	1	$\begin{pmatrix}-\frac{2}{3} & -\frac{1}{3} & -\frac{1}{2}\end{pmatrix}$ @ $\begin{pmatrix}0 & \frac{1}{2} & 0\end{pmatrix}$	[-5,9,16,-21]
	b$_{11}$	Sn$_2$	Sn$_1$	1	1	$\begin{pmatrix}\frac{1}{3} & -\frac{1}{3} & \frac{1}{2}\end{pmatrix}$ @ $\begin{pmatrix}\frac{1}{2} & \frac{1}{2} & \frac{1}{2}\end{pmatrix}$	[7,-11,-19,23]
	b$_{12}$	Sn$_2$	Sn$_1$	1	1	$\begin{pmatrix}-\frac{2}{3} & -\frac{1}{3} & \frac{1}{2}\end{pmatrix}$ @ $\begin{pmatrix}0 & \frac{1}{2} & \frac{1}{2}\end{pmatrix}$	[8,-12,-20,24]
B$_3$ [12j: m..]	b$_{13}$	Sn$_1$	Mn$_1$	1	1	$\begin{pmatrix}0.494533333333333 & -0.0109333333333333 & 0\end{pmatrix}$ @ $\begin{pmatrix}0.0860666666666667 & 0.672133333333333 & \frac{1}{4}\end{pmatrix}$	[1,17]
	b$_{14}$	Sn$_2$	Mn$_2$	1	1	$\begin{pmatrix}-0.494533333333333 & 0.0109333333333333 & 0\end{pmatrix}$ @ $\begin{pmatrix}0.913933333333333 & 0.327866666666667 & \frac{3}{4}\end{pmatrix}$	[2,13]
	b$_{15}$	Sn$_2$	Mn$_2$	1	1	$\begin{pmatrix}0.505466666666667 & 0.0109333333333333 & 0\end{pmatrix}$ @ $\begin{pmatrix}0.413933333333333 & 0.327866666666667 & \frac{3}{4}\end{pmatrix}$	[3,18]
	b$_{16}$	Sn$_2$	Mn$_3$	1	1	$\begin{pmatrix}-0.494533333333333 & -0.505466666666667 & 0\end{pmatrix}$ @ $\begin{pmatrix}0.913933333333333 & 0.586066666666667 & \frac{3}{4}\end{pmatrix}$	[4,19]
	b$_{17}$	Sn$_2$	Mn$_4$	1	1	$\begin{pmatrix}-0.0109333333333333 & 0.494533333333333 & 0\end{pmatrix}$ @ $\begin{pmatrix}0.672133333333333 & 0.0860666666666667 & \frac{3}{4}\end{pmatrix}$	[5,20]
	b$_{18}$	Sn$_1$	Mn$_1$	1	1	$\begin{pmatrix}-0.505466666666667 & -0.0109333333333333 & 0\end{pmatrix}$ @ $\begin{pmatrix}0.586066666666667 & 0.672133333333333 & \frac{1}{4}\end{pmatrix}$	[6,14]
	b$_{19}$	Sn$_1$	Mn$_5$	1	1	$\begin{pmatrix}0.494533333333333 & 0.505466666666667 & 0\end{pmatrix}$ @ $\begin{pmatrix}0.0860666666666667 & 0.413933333333333 & \frac{1}{4}\end{pmatrix}$	[7,15]
	b$_{20}$	Sn$_1$	Mn$_6$	1	1	$\begin{pmatrix}0.0109333333333333 & -0.494533333333333 & 0\end{pmatrix}$ @ $\begin{pmatrix}0.327866666666667 & 0.913933333333333 & \frac{1}{4}\end{pmatrix}$	[8,16]
	b$_{21}$	Sn$_1$	Mn$_6$	1	1	$\begin{pmatrix}0.0109333333333333 & 0.505466666666667 & 0\end{pmatrix}$ @ $\begin{pmatrix}0.327866666666667 & 0.413933333333333 & \frac{1}{4}\end{pmatrix}$	[9,24]
	b$_{22}$	Sn$_1$	Mn$_5$	1	1	$\begin{pmatrix}-0.505466666666667 & -0.494533333333333 & 0\end{pmatrix}$ @ $\begin{pmatrix}0.586066666666667 & 0.913933333333333 & \frac{1}{4}\end{pmatrix}$	[10,23]
	b$_{23}$	Sn$_2$	Mn$_3$	1	1	$\begin{pmatrix}0.505466666666667 & 0.494533333333333 & 0\end{pmatrix}$ @ $\begin{pmatrix}0.413933333333333 & 0.0860666666666667 & \frac{3}{4}\end{pmatrix}$	[11,22]
	b$_{24}$	Sn$_2$	Mn$_4$	1	1	$\begin{pmatrix}-0.0109333333333333 & -0.505466666666667 & 0\end{pmatrix}$ @ $\begin{pmatrix}0.672133333333333 & 0.586066666666667 & \frac{3}{4}\end{pmatrix}$	[12,21]

- SAMB:

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

$$\hat{\mathbb{Z}}_1 = \mathbb{X}_1[\mathbb{Q}_0^{(a,A_{1g})}] \otimes \mathbb{Y}_1[\mathbb{Q}_0^{(s,A_{1g})}]$$

No. 2 $\hat{\mathbb{Q}}_2^{(A_{1g})}$ $[\mathrm{M}_1, \mathrm{S}_1]$

$$\hat{\mathbb{Z}}_2 = \mathbb{X}_2[\mathbb{Q}_2^{(a,A_{1g})}] \otimes \mathbb{Y}_1[\mathbb{Q}_0^{(s,A_{1g})}]$$

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

$$\hat{\mathbb{Z}}_3 = \frac{\sqrt{2}\mathbb{X}_8[\mathbb{Q}_{2,0}^{(a,E_{2g})}] \otimes \mathbb{Y}_2[\mathbb{Q}_{2,0}^{(s,E_{2g})}]}{2} + \frac{\sqrt{2}\mathbb{X}_9[\mathbb{Q}_{2,1}^{(a,E_{2g})}] \otimes \mathbb{Y}_3[\mathbb{Q}_{2,1}^{(s,E_{2g})}]}{2}$$

No. 4 $\hat{\mathbb{Q}}_4^{(A_{1g})}$ $[\mathrm{M}_1, \mathrm{S}_1]$

$$\hat{\mathbb{Z}}_4 = \mathbb{X}_3[\mathbb{Q}_4^{(a,A_{1g})}] \otimes \mathbb{Y}_1[\mathbb{Q}_0^{(s,A_{1g})}]$$

No. 5 $\hat{\mathbb{Q}}_2^{(A_{1g})}$ $[\mathrm{M}_1, \mathrm{S}_1]$

$$\hat{\mathbb{Z}}_5 = \frac{\sqrt{2}\mathbb{X}_{12}[\mathbb{Q}_{4,0}^{(a,E_{2g},2)}] \otimes \mathbb{Y}_2[\mathbb{Q}_{2,0}^{(s,E_{2g})}]}{2} + \frac{\sqrt{2}\mathbb{X}_{13}[\mathbb{Q}_{4,1}^{(a,E_{2g},2)}] \otimes \mathbb{Y}_3[\mathbb{Q}_{2,1}^{(s,E_{2g})}]}{2}$$

No. 6 $\hat{\mathbb{Q}}_6^{(A_{1g},2)}$ $[\mathrm{M}_1, \mathrm{S}_1]$

$$\hat{\mathbb{Z}}_6 = \frac{\sqrt{2}\mathbb{X}_{10}[\mathbb{Q}_{4,0}^{(a,E_{2g},1)}] \otimes \mathbb{Y}_2[\mathbb{Q}_{2,0}^{(s,E_{2g})}]}{2} + \frac{\sqrt{2}\mathbb{X}_{11}[\mathbb{Q}_{4,1}^{(a,E_{2g},1)}] \otimes \mathbb{Y}_3[\mathbb{Q}_{2,1}^{(s,E_{2g})}]}{2}$$

No. 7 $\hat{\mathbb{Q}}_0^{(A_{1g})}$ $[\mathrm{M}_1, \mathrm{S}_2]$

$$\hat{\mathbb{Z}}_7 = \mathbb{X}_1[\mathbb{Q}_0^{(a,A_{1g})}] \otimes \mathbb{Y}_4[\mathbb{Q}_0^{(s,A_{1g})}]$$

No. 8 $\hat{\mathbb{Q}}_2^{(A_{1g})}$ $[\mathrm{M}_1, \mathrm{S}_2]$

$$\hat{\mathbb{Z}}_8 = \mathbb{X}_2[\mathbb{Q}_2^{(a,A_{1g})}] \otimes \mathbb{Y}_4[\mathbb{Q}_0^{(s,A_{1g})}]$$

No. 9 $\hat{\mathbb{Q}}_4^{(A_{1g})}$ [M$_1$, S$_2$]

$\hat{\mathbb{Z}}_9 = \mathbb{X}_3[\mathbb{Q}_4^{(a,A_{1g})}] \otimes \mathbb{Y}_4[\mathbb{Q}_0^{(s,A_{1g})}]$

No. 10 $\hat{\mathbb{Q}}_0^{(A_{1g})}$ [M$_1$, B$_1$]

$\hat{\mathbb{Z}}_{10} = \mathbb{X}_1[\mathbb{Q}_0^{(a,A_{1g})}] \otimes \mathbb{Y}_5[\mathbb{Q}_0^{(b,A_{1g})}]$

No. 11 $\hat{\mathbb{Q}}_2^{(A_{1g})}$ [M$_1$, B$_1$]

$\hat{\mathbb{Z}}_{11} = \mathbb{X}_2[\mathbb{Q}_2^{(a,A_{1g})}] \otimes \mathbb{Y}_5[\mathbb{Q}_0^{(b,A_{1g})}]$

No. 12 $\hat{\mathbb{Q}}_0^{(A_{1g})}$ [M$_1$, B$_1$]

$\hat{\mathbb{Z}}_{12} = \dfrac{\sqrt{2}\mathbb{X}_8[\mathbb{Q}_{2,0}^{(a,E_{2g})}] \otimes \mathbb{Y}_6[\mathbb{Q}_{2,0}^{(b,E_{2g})}]}{2} + \dfrac{\sqrt{2}\mathbb{X}_9[\mathbb{Q}_{2,1}^{(a,E_{2g})}] \otimes \mathbb{Y}_7[\mathbb{Q}_{2,1}^{(b,E_{2g})}]}{2}$

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

$\hat{\mathbb{Z}}_{13} = \mathbb{X}_3[\mathbb{Q}_4^{(a,A_{1g})}] \otimes \mathbb{Y}_5[\mathbb{Q}_0^{(b,A_{1g})}]$

No. 14 $\hat{\mathbb{Q}}_2^{(A_{1g})}$ [M$_1$, B$_1$]

$\hat{\mathbb{Z}}_{14} = \dfrac{\sqrt{2}\mathbb{X}_{12}[\mathbb{Q}_{4,0}^{(a,E_{2g},2)}] \otimes \mathbb{Y}_6[\mathbb{Q}_{2,0}^{(b,E_{2g})}]}{2} + \dfrac{\sqrt{2}\mathbb{X}_{13}[\mathbb{Q}_{4,1}^{(a,E_{2g},2)}] \otimes \mathbb{Y}_7[\mathbb{Q}_{2,1}^{(b,E_{2g})}]}{2}$

No. 15 $\hat{\mathbb{Q}}_6^{(A_{1g},2)}$ [M$_1$, B$_1$]

$\hat{\mathbb{Z}}_{15} = \dfrac{\sqrt{2}\mathbb{X}_{10}[\mathbb{Q}_{4,0}^{(a,E_{2g},1)}] \otimes \mathbb{Y}_6[\mathbb{Q}_{2,0}^{(b,E_{2g})}]}{2} + \dfrac{\sqrt{2}\mathbb{X}_{11}[\mathbb{Q}_{4,1}^{(a,E_{2g},1)}] \otimes \mathbb{Y}_7[\mathbb{Q}_{2,1}^{(b,E_{2g})}]}{2}$

No. 16 $\hat{\mathbb{Q}}_6^{(A_{1g},2)}$ [M$_1$, B$_1$]

$\hat{\mathbb{Z}}_{16} = -\mathbb{X}_{15}[\mathbb{M}_1^{(a,A_{2g})}] \otimes \mathbb{Y}_{10}[\mathbb{T}_6^{(b,A_{2g})}]$

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

$$\hat{\mathbb{Z}}_{17} = -\frac{\sqrt{2}\mathbb{X}_{17}[\mathbb{M}_{3,0}^{(a,E_{2g})}] \otimes \mathbb{Y}_8[\mathbb{T}_{2,0}^{(b,E_{2g})}]}{2} - \frac{\sqrt{2}\mathbb{X}_{18}[\mathbb{M}_{3,1}^{(a,E_{2g})}] \otimes \mathbb{Y}_9[\mathbb{T}_{2,1}^{(b,E_{2g})}]}{2}$$

No. 18 $\hat{\mathbb{Q}}_6^{(A_{1g},2)}\,[\mathrm{M}_1, \mathrm{B}_1]$

$$\hat{\mathbb{Z}}_{18} = \mathbb{X}_{16}[\mathbb{M}_3^{(a,A_{2g})}] \otimes \mathbb{Y}_{10}[\mathbb{T}_6^{(b,A_{2g})}]$$

No. 19 $\hat{\mathbb{Q}}_0^{(A_{1g})}\,[\mathrm{M}_1, \mathrm{B}_2]$

$$\hat{\mathbb{Z}}_{19} = \mathbb{X}_1[\mathbb{Q}_0^{(a,A_{1g})}] \otimes \mathbb{Y}_{11}[\mathbb{Q}_0^{(b,A_{1g})}]$$

No. 20 $\hat{\mathbb{Q}}_2^{(A_{1g})}\,[\mathrm{M}_1, \mathrm{B}_2]$

$$\hat{\mathbb{Z}}_{20} = \mathbb{X}_2[\mathbb{Q}_2^{(a,A_{1g})}] \otimes \mathbb{Y}_{11}[\mathbb{Q}_0^{(b,A_{1g})}]$$

No. 21 $\hat{\mathbb{Q}}_0^{(A_{1g})}\,[\mathrm{M}_1, \mathrm{B}_2]$

$$\hat{\mathbb{Z}}_{21} = \frac{\mathbb{X}_4[\mathbb{Q}_{2,0}^{(a,E_{1g})}] \otimes \mathbb{Y}_{12}[\mathbb{Q}_{2,0}^{(b,E_{1g})}]}{2} + \frac{\mathbb{X}_5[\mathbb{Q}_{2,1}^{(a,E_{1g})}] \otimes \mathbb{Y}_{13}[\mathbb{Q}_{2,1}^{(b,E_{1g})}]}{2} + \frac{\mathbb{X}_8[\mathbb{Q}_{2,0}^{(a,E_{2g})}] \otimes \mathbb{Y}_{14}[\mathbb{Q}_{2,0}^{(b,E_{2g})}]}{2} + \frac{\mathbb{X}_9[\mathbb{Q}_{2,1}^{(a,E_{2g})}] \otimes \mathbb{Y}_{15}[\mathbb{Q}_{2,1}^{(b,E_{2g})}]}{2}$$

No. 22 $\hat{\mathbb{Q}}_2^{(A_{1g})}\,[\mathrm{M}_1, \mathrm{B}_2]$

$$\hat{\mathbb{Z}}_{22} = \frac{\mathbb{X}_4[\mathbb{Q}_{2,0}^{(a,E_{1g})}] \otimes \mathbb{Y}_{12}[\mathbb{Q}_{2,0}^{(b,E_{1g})}]}{2} + \frac{\mathbb{X}_5[\mathbb{Q}_{2,1}^{(a,E_{1g})}] \otimes \mathbb{Y}_{13}[\mathbb{Q}_{2,1}^{(b,E_{1g})}]}{2} - \frac{\mathbb{X}_8[\mathbb{Q}_{2,0}^{(a,E_{2g})}] \otimes \mathbb{Y}_{14}[\mathbb{Q}_{2,0}^{(b,E_{2g})}]}{2} - \frac{\mathbb{X}_9[\mathbb{Q}_{2,1}^{(a,E_{2g})}] \otimes \mathbb{Y}_{15}[\mathbb{Q}_{2,1}^{(b,E_{2g})}]}{2}$$

No. 23 $\hat{\mathbb{Q}}_4^{(A_{1g})}\,[\mathrm{M}_1, \mathrm{B}_2]$

$$\hat{\mathbb{Z}}_{23} = \mathbb{X}_3[\mathbb{Q}_4^{(a,A_{1g})}] \otimes \mathbb{Y}_{11}[\mathbb{Q}_0^{(b,A_{1g})}]$$

No. 24 $\hat{\mathbb{Q}}_2^{(A_{1g})}\,[\mathrm{M}_1, \mathrm{B}_2]$

$$\hat{\mathbb{Z}}_{24} = \frac{\sqrt{6}\mathbb{X}_{12}[\mathbb{Q}_{4,0}^{(a,E_{2g},2)}] \otimes \mathbb{Y}_{14}[\mathbb{Q}_{2,0}^{(b,E_{2g})}]}{6} + \frac{\sqrt{6}\mathbb{X}_{13}[\mathbb{Q}_{4,1}^{(a,E_{2g},2)}] \otimes \mathbb{Y}_{15}[\mathbb{Q}_{2,1}^{(b,E_{2g})}]}{6} + \frac{\sqrt{3}\mathbb{X}_6[\mathbb{Q}_{4,0}^{(a,E_{1g})}] \otimes \mathbb{Y}_{12}[\mathbb{Q}_{2,0}^{(b,E_{1g})}]}{3} + \frac{\sqrt{3}\mathbb{X}_7[\mathbb{Q}_{4,1}^{(a,E_{1g})}] \otimes \mathbb{Y}_{13}[\mathbb{Q}_{2,1}^{(b,E_{1g})}]}{3}$$

$\boxed{\text{No. 25}}$ $\hat{\mathbb{Q}}_4^{(A_{1g})}$ $[\text{M}_1, \text{B}_2]$

$$\hat{\mathbb{Z}}_{25} = -\frac{\sqrt{3}\mathbb{X}_{12}[\mathbb{Q}_{4,0}^{(a,E_{2g},2)}] \otimes \mathbb{Y}_{14}[\mathbb{Q}_{2,0}^{(b,E_{2g})}]}{3} - \frac{\sqrt{3}\mathbb{X}_{13}[\mathbb{Q}_{4,1}^{(a,E_{2g},2)}] \otimes \mathbb{Y}_{15}[\mathbb{Q}_{2,1}^{(b,E_{2g})}]}{3} + \frac{\sqrt{6}\mathbb{X}_6[\mathbb{Q}_{4,0}^{(a,E_{1g})}] \otimes \mathbb{Y}_{12}[\mathbb{Q}_{2,0}^{(b,E_{1g})}]}{6} + \frac{\sqrt{6}\mathbb{X}_7[\mathbb{Q}_{4,1}^{(a,E_{1g})}] \otimes \mathbb{Y}_{13}[\mathbb{Q}_{2,1}^{(b,E_{1g})}]}{6}$$

$\boxed{\text{No. 26}}$ $\hat{\mathbb{Q}}_6^{(A_{1g},2)}$ $[\text{M}_1, \text{B}_2]$

$$\hat{\mathbb{Z}}_{26} = \frac{\sqrt{2}\mathbb{X}_{10}[\mathbb{Q}_{4,0}^{(a,E_{2g},1)}] \otimes \mathbb{Y}_{14}[\mathbb{Q}_{2,0}^{(b,E_{2g})}]}{2} + \frac{\sqrt{2}\mathbb{X}_{11}[\mathbb{Q}_{4,1}^{(a,E_{2g},1)}] \otimes \mathbb{Y}_{15}[\mathbb{Q}_{2,1}^{(b,E_{2g})}]}{2}$$

$\boxed{\text{No. 27}}$ $\hat{\mathbb{Q}}_0^{(A_{1g})}$ $[\text{M}_1, \text{B}_2]$

$$\hat{\mathbb{Z}}_{27} = \mathbb{X}_{14}[\mathbb{Q}_4^{(a,B_{2g})}] \otimes \mathbb{Y}_{16}[\mathbb{Q}_4^{(b,B_{2g})}]$$

$\boxed{\text{No. 28}}$ $\hat{\mathbb{Q}}_0^{(A_{1g})}$ $[\text{M}_1, \text{B}_3]$

$$\hat{\mathbb{Z}}_{28} = \mathbb{X}_1[\mathbb{Q}_0^{(a,A_{1g})}] \otimes \mathbb{Y}_{17}[\mathbb{Q}_0^{(b,A_{1g})}]$$

$\boxed{\text{No. 29}}$ $\hat{\mathbb{Q}}_2^{(A_{1g})}$ $[\text{M}_1, \text{B}_3]$

$$\hat{\mathbb{Z}}_{29} = \mathbb{X}_2[\mathbb{Q}_2^{(a,A_{1g})}] \otimes \mathbb{Y}_{17}[\mathbb{Q}_0^{(b,A_{1g})}]$$

$\boxed{\text{No. 30}}$ $\hat{\mathbb{Q}}_0^{(A_{1g})}$ $[\text{M}_1, \text{B}_3]$

$$\hat{\mathbb{Z}}_{30} = \frac{\sqrt{2}\mathbb{X}_8[\mathbb{Q}_{2,0}^{(a,E_{2g})}] \otimes \mathbb{Y}_{18}[\mathbb{Q}_{2,0}^{(b,E_{2g})}]}{2} + \frac{\sqrt{2}\mathbb{X}_9[\mathbb{Q}_{2,1}^{(a,E_{2g})}] \otimes \mathbb{Y}_{19}[\mathbb{Q}_{2,1}^{(b,E_{2g})}]}{2}$$

$\boxed{\text{No. 31}}$ $\hat{\mathbb{Q}}_6^{(A_{1g},2)}$ $[\text{M}_1, \text{B}_3]$

$$\hat{\mathbb{Z}}_{31} = \frac{\sqrt{2}\mathbb{X}_8[\mathbb{Q}_{2,0}^{(a,E_{2g})}] \otimes \mathbb{Y}_{20}[\mathbb{Q}_{4,0}^{(b,E_{2g},1)}]}{2} + \frac{\sqrt{2}\mathbb{X}_9[\mathbb{Q}_{2,1}^{(a,E_{2g})}] \otimes \mathbb{Y}_{21}[\mathbb{Q}_{4,1}^{(b,E_{2g},1)}]}{2}$$

$\boxed{\text{No. 32}}$ $\hat{\mathbb{Q}}_4^{(A_{1g})}$ $[\text{M}_1, \text{B}_3]$

$$\hat{\mathbb{Z}}_{32} = \mathbb{X}_3[\mathbb{Q}_4^{(a,A_{1g})}] \otimes \mathbb{Y}_{17}[\mathbb{Q}_0^{(b,A_{1g})}]$$

No. 33 $\hat{\mathbb{Q}}_2^{(A_{1g})}$ [M$_1$, B$_3$]

$$\hat{\mathbb{Z}}_{33} = \frac{\sqrt{2}\mathbb{X}_{12}[\mathbb{Q}_{4,0}^{(a,E_{2g},2)}] \otimes \mathbb{Y}_{18}[\mathbb{Q}_{2,0}^{(b,E_{2g})}]}{2} + \frac{\sqrt{2}\mathbb{X}_{13}[\mathbb{Q}_{4,1}^{(a,E_{2g},2)}] \otimes \mathbb{Y}_{19}[\mathbb{Q}_{2,1}^{(b,E_{2g})}]}{2}$$

No. 34 $\hat{\mathbb{Q}}_6^{(A_{1g},2)}$ [M$_1$, B$_3$]

$$\hat{\mathbb{Z}}_{34} = \frac{\sqrt{2}\mathbb{X}_{10}[\mathbb{Q}_{4,0}^{(a,E_{2g},1)}] \otimes \mathbb{Y}_{18}[\mathbb{Q}_{2,0}^{(b,E_{2g})}]}{2} + \frac{\sqrt{2}\mathbb{X}_{11}[\mathbb{Q}_{4,1}^{(a,E_{2g},1)}] \otimes \mathbb{Y}_{19}[\mathbb{Q}_{2,1}^{(b,E_{2g})}]}{2}$$

No. 35 $\hat{\mathbb{Q}}_0^{(A_{1g})}$ [M$_1$, B$_3$]

$$\hat{\mathbb{Z}}_{35} = \frac{\sqrt{2}\mathbb{X}_{10}[\mathbb{Q}_{4,0}^{(a,E_{2g},1)}] \otimes \mathbb{Y}_{20}[\mathbb{Q}_{4,0}^{(b,E_{2g},1)}]}{2} + \frac{\sqrt{2}\mathbb{X}_{11}[\mathbb{Q}_{4,1}^{(a,E_{2g},1)}] \otimes \mathbb{Y}_{21}[\mathbb{Q}_{4,1}^{(b,E_{2g},1)}]}{2}$$

No. 36 $\hat{\mathbb{Q}}_6^{(A_{1g},2)}$ [M$_1$, B$_3$]

$$\hat{\mathbb{Z}}_{36} = -\frac{\sqrt{2}\mathbb{X}_{12}[\mathbb{Q}_{4,0}^{(a,E_{2g},2)}] \otimes \mathbb{Y}_{20}[\mathbb{Q}_{4,0}^{(b,E_{2g},1)}]}{2} - \frac{\sqrt{2}\mathbb{X}_{13}[\mathbb{Q}_{4,1}^{(a,E_{2g},2)}] \otimes \mathbb{Y}_{21}[\mathbb{Q}_{4,1}^{(b,E_{2g},1)}]}{2}$$

No. 37 $\hat{\mathbb{Q}}_6^{(A_{1g},2)}$ [M$_1$, B$_3$]

$$\hat{\mathbb{Z}}_{37} = -\mathbb{X}_{15}[\mathbb{M}_1^{(a,A_{2g})}] \otimes \mathbb{Y}_{26}[\mathbb{T}_6^{(b,A_{2g})}]$$

No. 38 $\hat{\mathbb{Q}}_2^{(A_{1g})}$ [M$_1$, B$_3$]

$$\hat{\mathbb{Z}}_{38} = -\frac{\sqrt{2}\mathbb{X}_{17}[\mathbb{M}_{3,0}^{(a,E_{2g})}] \otimes \mathbb{Y}_{22}[\mathbb{T}_{2,0}^{(b,E_{2g})}]}{2} - \frac{\sqrt{2}\mathbb{X}_{18}[\mathbb{M}_{3,1}^{(a,E_{2g})}] \otimes \mathbb{Y}_{23}[\mathbb{T}_{2,1}^{(b,E_{2g})}]}{2}$$

No. 39 $\hat{\mathbb{Q}}_6^{(A_{1g},2)}$ [M$_1$, B$_3$]

$$\hat{\mathbb{Z}}_{39} = -\frac{\sqrt{2}\mathbb{X}_{17}[\mathbb{M}_{3,0}^{(a,E_{2g})}] \otimes \mathbb{Y}_{24}[\mathbb{T}_{4,0}^{(b,E_{2g},1)}]}{2} - \frac{\sqrt{2}\mathbb{X}_{18}[\mathbb{M}_{3,1}^{(a,E_{2g})}] \otimes \mathbb{Y}_{25}[\mathbb{T}_{4,1}^{(b,E_{2g},1)}]}{2}$$

No. 40 $\hat{\mathbb{Q}}_6^{(A_{1g},2)}$ [M$_1$, B$_3$]

$$\hat{\mathbb{Z}}_{40} = \mathbb{X}_{16}[\mathbb{M}_3^{(a,A_{2g})}] \otimes \mathbb{Y}_{26}[\mathbb{T}_6^{(b,A_{2g})}]$$

8

Table 5: Atomic SAMB group.

group	bra	ket
M_1	$d_u, d_v, d_{yz}, d_{zx}, d_{xy}$	$d_u, d_v, d_{yz}, d_{zx}, d_{xy}$

Table 6: Atomic SAMB.

symbol	type	group	form
$\mathbb{X}_1$	$\mathbb{Q}_0^{(a,A_{1g})}$	M_1	$\begin{pmatrix} \frac{\sqrt{5}}{5} & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{5}}{5} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{5}}{5} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{5}}{5} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{5} \end{pmatrix}$
$\mathbb{X}_2$	$\mathbb{Q}_2^{(a,A_{1g})}$	M_1	$\begin{pmatrix} \frac{\sqrt{14}}{7} & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{14}}{7} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{14}}{14} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{14}}{14} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{7} \end{pmatrix}$
$\mathbb{X}_3$	$\mathbb{Q}_4^{(a,A_{1g})}$	M_1	$\begin{pmatrix} \frac{3\sqrt{70}}{35} & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{70}}{70} & 0 & 0 & 0 \\ 0 & 0 & -\frac{2\sqrt{70}}{35} & 0 & 0 \\ 0 & 0 & 0 & -\frac{2\sqrt{70}}{35} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{70} \end{pmatrix}$
$\mathbb{X}_4$	$\mathbb{Q}_{2,0}^{(a,E_{1g})}$	M_1	$\begin{pmatrix} 0 & 0 & 0 & \frac{\sqrt{14}}{14} & 0 \\ 0 & 0 & 0 & \frac{\sqrt{42}}{14} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{14} \\ \frac{\sqrt{14}}{14} & \frac{\sqrt{42}}{14} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{42}}{14} & 0 & 0 \end{pmatrix}$

continued …

Table 6

symbol	type	group	form
$\mathbb{X}_5$	$\mathbb{Q}_{2,1}^{(a,E_{1g})}$	M$_1$	$\begin{pmatrix} 0 & 0 & \frac{\sqrt{14}}{14} & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{42}}{14} & 0 & 0 \\ \frac{\sqrt{14}}{14} & -\frac{\sqrt{42}}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{14} \\ 0 & 0 & 0 & \frac{\sqrt{42}}{14} & 0 \end{pmatrix}$
$\mathbb{X}_6$	$\mathbb{Q}_{4,0}^{(a,E_{1g})}$	M$_1$	$\begin{pmatrix} 0 & 0 & 0 & \frac{\sqrt{21}}{7} & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{7}}{14} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{14} \\ \frac{\sqrt{21}}{7} & -\frac{\sqrt{7}}{14} & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{7}}{14} & 0 & 0 \end{pmatrix}$
$\mathbb{X}_7$	$\mathbb{Q}_{4,1}^{(a,E_{1g})}$	M$_1$	$\begin{pmatrix} 0 & 0 & \frac{\sqrt{21}}{7} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 \\ \frac{\sqrt{21}}{7} & \frac{\sqrt{7}}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{14} \\ 0 & 0 & 0 & -\frac{\sqrt{7}}{14} & 0 \end{pmatrix}$
$\mathbb{X}_8$	$\mathbb{Q}_{2,0}^{(a,E_{2g})}$	M$_1$	$\begin{pmatrix} 0 & -\frac{\sqrt{14}}{7} & 0 & 0 & 0 \\ -\frac{\sqrt{14}}{7} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{42}}{14} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{42}}{14} & 0 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_9$	$\mathbb{Q}_{2,1}^{(a,E_{2g})}$	M$_1$	$\begin{pmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{7} \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{42}}{14} & 0 \\ 0 & 0 & -\frac{\sqrt{42}}{14} & 0 & 0 \\ \frac{\sqrt{14}}{7} & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{10}$	$\mathbb{Q}_{4,0}^{(a,E_{2g},1)}$	M$_1$	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{2} \end{pmatrix}$

continued …

Table 6

symbol	type	group	form
$\mathbb{X}_{11}$	$\mathbb{Q}_{4,1}^{(a,E_{2g},1)}$	M_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{2} \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}}{2} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{12}$	$\mathbb{Q}_{4,0}^{(a,E_{2g},2)}$	M_1	$\begin{pmatrix} 0 & \frac{\sqrt{42}}{14} & 0 & 0 & 0 \\ \frac{\sqrt{42}}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{14}}{7} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{14}}{7} & 0 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{13}$	$\mathbb{Q}_{4,1}^{(a,E_{2g},2)}$	M_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{42}}{14} \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{14}}{7} & 0 \\ 0 & 0 & -\frac{\sqrt{14}}{7} & 0 & 0 \\ -\frac{\sqrt{42}}{14} & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{14}$	$\mathbb{Q}_{4}^{(a,B_{2g})}$	M_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{1}{2} & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 0 & \frac{1}{2} & 0 \end{pmatrix}$
$\mathbb{X}_{15}$	$\mathbb{M}_{1}^{(a,A_{2g})}$	M_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{5} \\ 0 & 0 & 0 & \frac{\sqrt{10}i}{10} & 0 \\ 0 & 0 & -\frac{\sqrt{10}i}{10} & 0 & 0 \\ 0 & \frac{\sqrt{10}i}{5} & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{16}$	$\mathbb{M}_{3}^{(a,A_{2g})}$	M_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{10} \\ 0 & 0 & 0 & \frac{\sqrt{10}i}{5} & 0 \\ 0 & 0 & -\frac{\sqrt{10}i}{5} & 0 & 0 \\ 0 & -\frac{\sqrt{10}i}{10} & 0 & 0 & 0 \end{pmatrix}$

Table 6

symbol	type	group	form
$\mathbb{X}_{17}$	$\mathbb{M}_{3,0}^{(a,E_{2g})}$	M_1	$\begin{pmatrix} 0 & -\frac{\sqrt{2}i}{2} & 0 & 0 & 0 \\ \frac{\sqrt{2}i}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
$\mathbb{X}_{18}$	$\mathbb{M}_{3,1}^{(a,E_{2g})}$	M_1	$\begin{pmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{2} \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}i}{2} & 0 & 0 & 0 & 0 \end{pmatrix}$

Table 7: Cluster SAMB.

symbol	type	cluster	form
$\mathbb{Y}_1$	$\mathbb{Q}_0^{(s,A_{1g})}$	S_1	$\begin{pmatrix} \frac{\sqrt{6}}{6} & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}}{6} \end{pmatrix}$
$\mathbb{Y}_2$	$\mathbb{Q}_{2,0}^{(s,E_{2g})}$	S_1	$\begin{pmatrix} \frac{\sqrt{3}}{3} & \frac{\sqrt{3}}{3} & -\frac{\sqrt{3}}{6} & -\frac{\sqrt{3}}{6} & -\frac{\sqrt{3}}{6} & -\frac{\sqrt{3}}{6} \end{pmatrix}$
$\mathbb{Y}_3$	$\mathbb{Q}_{2,1}^{(s,E_{2g})}$	S_1	$\begin{pmatrix} 0 & 0 & -\frac{1}{2} & \frac{1}{2} & -\frac{1}{2} & \frac{1}{2} \end{pmatrix}$
$\mathbb{Y}_4$	$\mathbb{Q}_0^{(s,A_{1g})}$	S_2	$\begin{pmatrix} \frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} \end{pmatrix}$
$\mathbb{Y}_5$	$\mathbb{Q}_0^{(b,A_{1g})}$	B_1	$\begin{pmatrix} \frac{\sqrt{6}}{6} & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}}{6} \end{pmatrix}$
$\mathbb{Y}_6$	$\mathbb{Q}_{2,0}^{(b,E_{2g})}$	B_1	$\begin{pmatrix} \frac{\sqrt{3}}{6} & \frac{\sqrt{3}}{6} & \frac{\sqrt{3}}{6} & -\frac{\sqrt{3}}{3} & \frac{\sqrt{3}}{6} & -\frac{\sqrt{3}}{3} \end{pmatrix}$
$\mathbb{Y}_7$	$\mathbb{Q}_{2,1}^{(b,E_{2g})}$	B_1	$\begin{pmatrix} -\frac{1}{2} & -\frac{1}{2} & \frac{1}{2} & 0 & \frac{1}{2} & 0 \end{pmatrix}$
$\mathbb{Y}_8$	$\mathbb{T}_{2,0}^{(b,E_{2g})}$	B_1	$\begin{pmatrix} \frac{i}{2} & \frac{i}{2} & \frac{i}{2} & 0 & \frac{i}{2} & 0 \end{pmatrix}$
$\mathbb{Y}_9$	$\mathbb{T}_{2,1}^{(b,E_{2g})}$	B_1	$\begin{pmatrix} \frac{\sqrt{3}i}{6} & \frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}i}{3} & -\frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}i}{3} \end{pmatrix}$
$\mathbb{Y}_{10}$	$\mathbb{T}_6^{(b,A_{2g})}$	B_1	$\begin{pmatrix} \frac{\sqrt{6}i}{6} & \frac{\sqrt{6}i}{6} & -\frac{\sqrt{6}i}{6} & \frac{\sqrt{6}i}{6} & -\frac{\sqrt{6}i}{6} & \frac{\sqrt{6}i}{6} \end{pmatrix}$
$\mathbb{Y}_{11}$	$\mathbb{Q}_0^{(b,A_{1g})}$	B_2	$\begin{pmatrix} \frac{\sqrt{6}}{6} & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}}{6} \end{pmatrix}$
$\mathbb{Y}_{12}$	$\mathbb{Q}_{2,0}^{(b,E_{1g})}$	B_2	$\begin{pmatrix} 0 & 0 & \frac{1}{2} & -\frac{1}{2} & -\frac{1}{2} & \frac{1}{2} \end{pmatrix}$
$\mathbb{Y}_{13}$	$\mathbb{Q}_{2,1}^{(b,E_{1g})}$	B_2	$\begin{pmatrix} \frac{\sqrt{3}}{3} & -\frac{\sqrt{3}}{3} & -\frac{\sqrt{3}}{6} & -\frac{\sqrt{3}}{6} & \frac{\sqrt{3}}{6} & \frac{\sqrt{3}}{6} \end{pmatrix}$

Table 7

symbol	type	cluster	form
$\mathbb{Y}_{14}$	$\mathbb{Q}_{2,0}^{(b,E_{2g})}$	B$_2$	$\left(\frac{\sqrt{3}}{3}\quad \frac{\sqrt{3}}{3}\quad -\frac{\sqrt{3}}{6}\quad -\frac{\sqrt{3}}{6}\quad -\frac{\sqrt{3}}{6}\quad -\frac{\sqrt{3}}{6}\right)$
$\mathbb{Y}_{15}$	$\mathbb{Q}_{2,1}^{(b,E_{2g})}$	B$_2$	$\left(0\quad 0\quad -\frac{1}{2}\quad \frac{1}{2}\quad -\frac{1}{2}\quad \frac{1}{2}\right)$
$\mathbb{Y}_{16}$	$\mathbb{Q}_{4}^{(b,B_{2g})}$	B$_2$	$\left(\frac{\sqrt{6}}{6}\quad -\frac{\sqrt{6}}{6}\quad \frac{\sqrt{6}}{6}\quad \frac{\sqrt{6}}{6}\quad -\frac{\sqrt{6}}{6}\quad -\frac{\sqrt{6}}{6}\right)$
$\mathbb{Y}_{17}$	$\mathbb{Q}_{0}^{(b,A_{1g})}$	B$_3$	$\left(\frac{\sqrt{3}}{6}\quad \frac{\sqrt{3}}{6}\quad \frac{\sqrt{3}}{6}\quad \frac{\sqrt{3}}{6}\quad \frac{\sqrt{3}}{6}\quad \frac{\sqrt{3}}{6}\quad \frac{\sqrt{3}}{6}\quad \frac{\sqrt{3}}{6}\quad \frac{\sqrt{3}}{6}\quad \frac{\sqrt{3}}{6}\quad \frac{\sqrt{3}}{6}\quad \frac{\sqrt{3}}{6}\right)$
$\mathbb{Y}_{18}$	$\mathbb{Q}_{2,0}^{(b,E_{2g})}$	B$_3$	$\left(\frac{\sqrt{2}}{4}\quad \frac{\sqrt{2}}{4}\quad \frac{\sqrt{2}}{4}\quad 0\quad -\frac{\sqrt{2}}{4}\quad \frac{\sqrt{2}}{4}\quad 0\quad -\frac{\sqrt{2}}{4}\quad 0\quad -\frac{\sqrt{2}}{4}\quad -\frac{\sqrt{2}}{4}\quad 0\right)$
$\mathbb{Y}_{19}$	$\mathbb{Q}_{2,1}^{(b,E_{2g})}$	B$_3$	$\left(-\frac{\sqrt{6}}{12}\quad -\frac{\sqrt{6}}{12}\quad \frac{\sqrt{6}}{12}\quad -\frac{\sqrt{6}}{6}\quad \frac{\sqrt{6}}{12}\quad \frac{\sqrt{6}}{12}\quad -\frac{\sqrt{6}}{6}\quad \frac{\sqrt{6}}{12}\quad \frac{\sqrt{6}}{6}\quad -\frac{\sqrt{6}}{12}\quad -\frac{\sqrt{6}}{12}\quad \frac{\sqrt{6}}{6}\right)$
$\mathbb{Y}_{20}$	$\mathbb{Q}_{4,0}^{(b,E_{2g},1)}$	B$_3$	$\left(\frac{\sqrt{6}}{12}\quad \frac{\sqrt{6}}{12}\quad \frac{\sqrt{6}}{12}\quad -\frac{\sqrt{6}}{6}\quad \frac{\sqrt{6}}{12}\quad \frac{\sqrt{6}}{12}\quad -\frac{\sqrt{6}}{6}\quad \frac{\sqrt{6}}{12}\quad -\frac{\sqrt{6}}{6}\quad \frac{\sqrt{6}}{12}\quad \frac{\sqrt{6}}{12}\quad -\frac{\sqrt{6}}{6}\right)$
$\mathbb{Y}_{21}$	$\mathbb{Q}_{4,1}^{(b,E_{2g},1)}$	B$_3$	$\left(\frac{\sqrt{2}}{4}\quad \frac{\sqrt{2}}{4}\quad -\frac{\sqrt{2}}{4}\quad 0\quad \frac{\sqrt{2}}{4}\quad -\frac{\sqrt{2}}{4}\quad 0\quad \frac{\sqrt{2}}{4}\quad 0\quad -\frac{\sqrt{2}}{4}\quad -\frac{\sqrt{2}}{4}\quad 0\right)$
$\mathbb{Y}_{22}$	$\mathbb{T}_{2,0}^{(b,E_{2g})}$	B$_3$	$\left(\frac{\sqrt{2}i}{4}\quad \frac{\sqrt{2}i}{4}\quad \frac{\sqrt{2}i}{4}\quad 0\quad -\frac{\sqrt{2}i}{4}\quad \frac{\sqrt{2}i}{4}\quad 0\quad -\frac{\sqrt{2}i}{4}\quad 0\quad -\frac{\sqrt{2}i}{4}\quad -\frac{\sqrt{2}i}{4}\quad 0\right)$
$\mathbb{Y}_{23}$	$\mathbb{T}_{2,1}^{(b,E_{2g})}$	B$_3$	$\left(-\frac{\sqrt{6}i}{12}\quad -\frac{\sqrt{6}i}{12}\quad \frac{\sqrt{6}i}{12}\quad -\frac{\sqrt{6}i}{12}\quad \frac{\sqrt{6}i}{12}\quad \frac{\sqrt{6}i}{12}\quad -\frac{\sqrt{6}i}{12}\quad \frac{\sqrt{6}i}{12}\quad \frac{\sqrt{6}i}{6}\quad -\frac{\sqrt{6}i}{12}\quad -\frac{\sqrt{6}i}{12}\quad \frac{\sqrt{6}i}{6}\right)$
$\mathbb{Y}_{24}$	$\mathbb{T}_{4,0}^{(b,E_{2g},1)}$	B$_3$	$\left(\frac{\sqrt{6}i}{12}\quad \frac{\sqrt{6}i}{12}\quad \frac{\sqrt{6}i}{12}\quad -\frac{\sqrt{6}i}{6}\quad \frac{\sqrt{6}i}{12}\quad \frac{\sqrt{6}i}{12}\quad -\frac{\sqrt{6}i}{6}\quad \frac{\sqrt{6}i}{12}\quad -\frac{\sqrt{6}i}{6}\quad \frac{\sqrt{6}i}{12}\quad \frac{\sqrt{6}i}{12}\quad -\frac{\sqrt{6}i}{6}\right)$
$\mathbb{Y}_{25}$	$\mathbb{T}_{4,1}^{(b,E_{2g},1)}$	B$_3$	$\left(\frac{\sqrt{2}i}{4}\quad \frac{\sqrt{2}i}{4}\quad -\frac{\sqrt{2}i}{4}\quad 0\quad \frac{\sqrt{2}i}{4}\quad -\frac{\sqrt{2}i}{4}\quad 0\quad \frac{\sqrt{2}i}{4}\quad 0\quad -\frac{\sqrt{2}i}{4}\quad -\frac{\sqrt{2}i}{4}\quad 0\right)$
$\mathbb{Y}_{26}$	$\mathbb{T}_{6}^{(b,A_{2g})}$	B$_3$	$\left(\frac{\sqrt{3}i}{6}\quad \frac{\sqrt{3}i}{6}\quad -\frac{\sqrt{3}i}{6}\quad -\frac{\sqrt{3}i}{6}\quad -\frac{\sqrt{3}i}{6}\quad -\frac{\sqrt{3}i}{6}\quad -\frac{\sqrt{3}i}{6}\quad -\frac{\sqrt{3}i}{6}\quad \frac{\sqrt{3}i}{6}\quad \frac{\sqrt{3}i}{6}\quad \frac{\sqrt{3}i}{6}\quad \frac{\sqrt{3}i}{6}\right)$

Table 8: Polar harmonics.

No.	symbol	rank	irrep.	mul.	comp.	form
1	$\mathbb{Q}_{0}^{(A_{1g})}$	0	A_{1g}	–	–	1
2	$\mathbb{Q}_{2}^{(A_{1g})}$	2	A_{1g}	–	–	$-\frac{x^2}{2}-\frac{y^2}{2}+z^2$
3	$\mathbb{Q}_{2,0}^{(E_{1g})}$	2	E_{1g}	–	0	$\sqrt{3}xz$
4	$\mathbb{Q}_{2,1}^{(E_{1g})}$	2	E_{1g}	–	1	$\sqrt{3}yz$
5	$\mathbb{Q}_{2,0}^{(E_{2g})}$	2	E_{2g}	–	0	$\frac{\sqrt{3}(x-y)(x+y)}{2}$
6	$\mathbb{Q}_{2,1}^{(E_{2g})}$	2	E_{2g}	–	1	$-\sqrt{3}xy$
7	$\mathbb{Q}_{4}^{(A_{1g})}$	4	A_{1g}	–	–	$\frac{3x^4}{8}+\frac{3x^2y^2}{4}-3x^2z^2+\frac{3y^4}{8}-3y^2z^2+z^4$
8	$\mathbb{Q}_{4}^{(B_{2g})}$	4	B_{2g}	–	–	$\frac{\sqrt{70}yz(3x^2-y^2)}{4}$

continued ...

13

Table 8

No.	symbol	rank	irrep.	mul.	comp.	form
9	$\mathbb{Q}_{4,0}^{(E_{1g})}$	4	E_{1g}	–	0	$-\dfrac{\sqrt{10}\,xz(3x^2+3y^2-4z^2)}{4}$
10	$\mathbb{Q}_{4,1}^{(E_{1g})}$	4	E_{1g}	–	1	$-\dfrac{\sqrt{10}\,yz(3x^2+3y^2-4z^2)}{4}$
11	$\mathbb{Q}_{4,0}^{(E_{2g},1)}$	4	E_{2g}	1	0	$\dfrac{\sqrt{35}(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$
12	$\mathbb{Q}_{4,1}^{(E_{2g},1)}$	4	E_{2g}	1	1	$\dfrac{\sqrt{35}\,xy(x-y)(x+y)}{2}$
13	$\mathbb{Q}_{4,0}^{(E_{2g},2)}$	4	E_{2g}	2	0	$-\dfrac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$
14	$\mathbb{Q}_{4,1}^{(E_{2g},2)}$	4	E_{2g}	2	1	$\dfrac{\sqrt{5}\,xy(x^2+y^2-6z^2)}{2}$
15	$\mathbb{Q}_6^{(A_{2g})}$	6	A_{2g}	–	–	$\dfrac{\sqrt{462}\,xy(x^2-3y^2)(3x^2-y^2)}{16}$

Table 9: Axial harmonics.

No.	symbol	rank	irrep.	mul.	comp.	form
1	$\mathbb{G}_1^{(A_{2g})}$	1	A_{2g}	–	–	Z
2	$\mathbb{G}_3^{(A_{2g})}$	3	A_{2g}	–	–	$-\dfrac{Z(3X^2+3Y^2-2Z^2)}{2}$
3	$\mathbb{G}_{3,0}^{(E_{2g})}$	3	E_{2g}	–	0	$\sqrt{15}\,XYZ$
4	$\mathbb{G}_{3,1}^{(E_{2g})}$	3	E_{2g}	–	1	$\dfrac{\sqrt{15}\,Z(X-Y)(X+Y)}{2}$

- Group info.: Generator = $\{3_{001}^+|0\}$, $\{2_{001}|00\tfrac{1}{2}\}$, $\{2_{110}|0\}$, $\{-1|0\}$

Table 10: Conjugacy class (point-group part).

rep. SO	symmetry operations
$\{1|0\}$	$\{1|0\}$
$\{2_{001}|00\tfrac{1}{2}\}$	$\{2_{001}|00\tfrac{1}{2}\}$

continued …

Table 10

rep. SO	symmetry operations
$\{2_{100}\|0\}$	$\{2_{100}\|0\}$, $\{2_{010}\|0\}$, $\{2_{110}\|0\}$
$\{2_{120}\|00\frac{1}{2}\}$	$\{2_{120}\|00\frac{1}{2}\}$, $\{2_{210}\|00\frac{1}{2}\}$, $\{2_{1-10}\|00\frac{1}{2}\}$
$\{3^{+}_{001}\|0\}$	$\{3^{+}_{001}\|0\}$, $\{3^{-}_{001}\|0\}$
$\{6^{+}_{001}\|00\frac{1}{2}\}$	$\{6^{+}_{001}\|00\frac{1}{2}\}$, $\{6^{-}_{001}\|00\frac{1}{2}\}$
$\{-1\|0\}$	$\{-1\|0\}$
$\{m_{100}\|0\}$	$\{m_{100}\|0\}$, $\{m_{010}\|0\}$, $\{m_{110}\|0\}$
$\{m_{001}\|00\frac{1}{2}\}$	$\{m_{001}\|00\frac{1}{2}\}$
$\{m_{120}\|00\frac{1}{2}\}$	$\{m_{120}\|00\frac{1}{2}\}$, $\{m_{210}\|00\frac{1}{2}\}$, $\{m_{1-10}\|00\frac{1}{2}\}$
$\{-3^{+}_{001}\|0\}$	$\{-3^{+}_{001}\|0\}$, $\{-3^{-}_{001}\|0\}$
$\{-6^{+}_{001}\|00\frac{1}{2}\}$	$\{-6^{+}_{001}\|00\frac{1}{2}\}$, $\{-6^{-}_{001}\|00\frac{1}{2}\}$

Table 11: Symmetry operations.

No.	SO	No.	SO	No.	SO	No.	SO	No.	SO
1	$\{1\|0\}$	2	$\{2_{001}\|00\frac{1}{2}\}$	3	$\{2_{100}\|0\}$	4	$\{2_{010}\|0\}$	5	$\{2_{110}\|0\}$
6	$\{2_{120}\|00\frac{1}{2}\}$	7	$\{2_{210}\|00\frac{1}{2}\}$	8	$\{2_{1-10}\|00\frac{1}{2}\}$	9	$\{3^{+}_{001}\|0\}$	10	$\{3^{-}_{001}\|0\}$
11	$\{6^{+}_{001}\|00\frac{1}{2}\}$	12	$\{6^{-}_{001}\|00\frac{1}{2}\}$	13	$\{-1\|0\}$	14	$\{m_{100}\|0\}$	15	$\{m_{010}\|0\}$
16	$\{m_{110}\|0\}$	17	$\{m_{001}\|00\frac{1}{2}\}$	18	$\{m_{120}\|00\frac{1}{2}\}$	19	$\{m_{210}\|00\frac{1}{2}\}$	20	$\{m_{1-10}\|00\frac{1}{2}\}$
21	$\{-3^{+}_{001}\|0\}$	22	$\{-3^{-}_{001}\|0\}$	23	$\{-6^{+}_{001}\|00\frac{1}{2}\}$	24	$\{-6^{-}_{001}\|00\frac{1}{2}\}$		

Table 12: Character table (point-group part).

	1	2_{001}	2_{100}	2_{120}	3^{+}_{001}	6^{+}_{001}	-1	m_{100}	m_{001}	m_{120}	-3^{+}_{001}	-6^{+}_{001}
A_{1g}	1	1	1	1	1	1	1	1	1	1	1	1
A_{2g}	1	1	-1	-1	1	1	1	-1	1	-1	1	1
B_{1g}	1	-1	-1	1	1	-1	1	-1	-1	1	1	-1
B_{2g}	1	-1	1	-1	1	-1	1	1	-1	-1	1	-1

Table 12

	1	2_{001}	2_{100}	2_{120}	3^+_{001}	6^+_{001}	-1	m_{100}	m_{001}	m_{120}	-3^+_{001}	-6^+_{001}
E_{1g}	2	-2	0	0	-1	1	2	0	-2	0	-1	1
E_{2g}	2	2	0	0	-1	-1	2	0	2	0	-1	-1
A_{1u}	1	1	1	1	1	1	-1	-1	-1	-1	-1	-1
A_{2u}	1	1	-1	-1	1	1	-1	1	-1	1	-1	-1
B_{1u}	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1
B_{2u}	1	-1	1	-1	1	-1	-1	-1	1	1	-1	1
E_{1u}	2	-2	0	0	-1	1	-2	0	2	0	1	-1
E_{2u}	2	2	0	0	-1	-1	-2	0	-2	0	1	1

Table 13: Parity conversion.

$\leftrightarrow$	$\leftrightarrow$	$\leftrightarrow$	$\leftrightarrow$	$\leftrightarrow$
A_{1g} (A_{1u})	A_{2g} (A_{2u})	B_{1g} (B_{1u})	B_{2g} (B_{2u})	E_{1g} (E_{1u})
E_{2g} (E_{2u})	A_{1u} (A_{1g})	A_{2u} (A_{2g})	B_{1u} (B_{1g})	B_{2u} (B_{2g})
E_{1u} (E_{1g})	E_{2u} (E_{2g})			

Table 14: Symmetric product, $[\Gamma \otimes \Gamma']_+$.

	A_{1g}	A_{2g}	B_{1g}	B_{2g}	E_{1g}	E_{2g}	A_{1u}	A_{2u}	B_{1u}	B_{2u}	E_{1u}	E_{2u}
A_{1g}	A_{1g}	A_{2g}	B_{1g}	B_{2g}	E_{1g}	E_{2g}	A_{1u}	A_{2u}	B_{1u}	B_{2u}	E_{1u}	E_{2u}
A_{2g}		A_{1g}	B_{2g}	B_{1g}	E_{1g}	E_{2g}	A_{2u}	A_{1u}	B_{2u}	B_{1u}	E_{1u}	E_{2u}
B_{1g}			A_{1g}	A_{2g}	E_{2g}	E_{1g}	B_{1u}	B_{2u}	A_{1u}	A_{2u}	E_{2u}	E_{1u}
B_{2g}				A_{1g}	E_{2g}	E_{1g}	B_{2u}	B_{1u}	A_{2u}	A_{1u}	E_{2u}	E_{1u}
E_{1g}					$A_{1g} + E_{2g}$	$B_{1g} + B_{2g} + E_{1g}$	E_{1u}	E_{1u}	E_{2u}	E_{2u}	$A_{1u} + A_{2u} + E_{2u}$	$B_{1u} + B_{2u} + E_{1u}$
E_{2g}						$A_{1g} + E_{2g}$	E_{2u}	E_{2u}	E_{1u}	E_{1u}	$B_{1u} + B_{2u} + E_{1u}$	$A_{1u} + A_{2u} + E_{2u}$
A_{1u}							A_{1g}	A_{2g}	B_{1g}	B_{2g}	E_{1g}	E_{2g}
A_{2u}								A_{1g}	B_{2g}	B_{1g}	E_{1g}	E_{2g}
B_{1u}									A_{1g}	A_{2g}	E_{2g}	E_{1g}
B_{2u}										A_{1g}	E_{2g}	E_{1g}
E_{1u}											$A_{1g} + E_{2g}$	$B_{1g} + B_{2g} + E_{1g}$
E_{2u}												$A_{1g} + E_{2g}$

Table 15: Anti-symmetric product, $[\Gamma \otimes \Gamma]_-$.

A_{1g}	A_{2g}	B_{1g}	B_{2g}	E_{1g}	E_{2g}	A_{1u}	A_{2u}	B_{1u}	B_{2u}	E_{1u}	E_{2u}
–	–	–	–	A_{2g}	A_{2g}	–	–	–	–	A_{2g}	A_{2g}

Table 16: Virtual-cluster sites.

No.	position	No.	position	No.	position	No.	position
1	$\left(1+\sqrt{3}\quad -1+\sqrt{3}\quad 1\right)$	2	$\left(-\sqrt{3}-1\quad 1-\sqrt{3}\quad 1\right)$	3	$\left(2\quad 1-\sqrt{3}\quad -1\right)$	4	$\left(-\sqrt{3}-1\quad -2\quad -1\right)$
5	$\left(-1+\sqrt{3}\quad 1+\sqrt{3}\quad -1\right)$	6	$\left(-2\quad -1+\sqrt{3}\quad -1\right)$	7	$\left(1+\sqrt{3}\quad 2\quad -1\right)$	8	$\left(1-\sqrt{3}\quad -\sqrt{3}-1\quad -1\right)$
9	$\left(1-\sqrt{3}\quad 2\quad 1\right)$	10	$\left(-2\quad -\sqrt{3}-1\quad 1\right)$	11	$\left(2\quad 1+\sqrt{3}\quad 1\right)$	12	$\left(-1+\sqrt{3}\quad -2\quad 1\right)$
13	$\left(-\sqrt{3}-1\quad 1-\sqrt{3}\quad -1\right)$	14	$\left(-2\quad -1+\sqrt{3}\quad 1\right)$	15	$\left(1+\sqrt{3}\quad 2\quad 1\right)$	16	$\left(1-\sqrt{3}\quad -\sqrt{3}-1\quad 1\right)$
17	$\left(1+\sqrt{3}\quad -1+\sqrt{3}\quad -1\right)$	18	$\left(2\quad 1-\sqrt{3}\quad 1\right)$	19	$\left(-\sqrt{3}-1\quad -2\quad 1\right)$	20	$\left(-1+\sqrt{3}\quad 1+\sqrt{3}\quad 1\right)$
21	$\left(-1+\sqrt{3}\quad -2\quad -1\right)$	22	$\left(2\quad 1+\sqrt{3}\quad -1\right)$	23	$\left(-2\quad -\sqrt{3}-1\quad -1\right)$	24	$\left(1-\sqrt{3}\quad 2\quad -1\right)$

Table 17: Virtual-cluster basis.

symbol	1	2	3	4	5	6	7	8	9	10
$\mathbb{Q}_0^{(A_{1g})}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$
	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$
	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$						
$\mathbb{Q}_1^{(A_{2u})}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$
	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$
	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$						
$\mathbb{Q}_{1,0}^{(E_{1u})}$	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$
	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$

continued ...

17

Table 17

symbol	1	2	3	4	5	6	7	8	9	10
	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{6}}{12}$						
$\mathbb{Q}_{1,1}^{(E_{1u})}$	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$
	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$
	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$	$\frac{\sqrt{6}}{12}$						
$\mathbb{Q}_{2,0}^{(E_{1g})}$	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$
	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$
	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$\frac{\sqrt{6}}{12}$						
$\mathbb{Q}_{2,1}^{(E_{1g})}$	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$
	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$
	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{6}}{12}$						
$\mathbb{Q}_{2,0}^{(E_{2g})}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	0	$-\frac{1}{4}$	$\frac{1}{4}$	0	$-\frac{1}{4}$	0	$-\frac{1}{4}$
	$-\frac{1}{4}$	0	$\frac{1}{4}$	$\frac{1}{4}$	0	$-\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	0	$-\frac{1}{4}$
	0	$-\frac{1}{4}$	$-\frac{1}{4}$	0						
$\mathbb{Q}_{2,1}^{(E_{2g})}$	$-\frac{\sqrt{3}}{12}$	$-\frac{\sqrt{3}}{12}$	$\frac{\sqrt{3}}{12}$	$-\frac{\sqrt{3}}{6}$	$\frac{\sqrt{3}}{12}$	$\frac{\sqrt{3}}{12}$	$-\frac{\sqrt{3}}{6}$	$\frac{\sqrt{3}}{12}$	$\frac{\sqrt{3}}{6}$	$-\frac{\sqrt{3}}{12}$
	$-\frac{\sqrt{3}}{12}$	$\frac{\sqrt{3}}{6}$	$-\frac{\sqrt{3}}{12}$	$\frac{\sqrt{3}}{12}$	$-\frac{\sqrt{3}}{6}$	$\frac{\sqrt{3}}{12}$	$-\frac{\sqrt{3}}{12}$	$\frac{\sqrt{3}}{12}$	$-\frac{\sqrt{3}}{6}$	$\frac{\sqrt{3}}{12}$
	$\frac{\sqrt{3}}{6}$	$-\frac{\sqrt{3}}{12}$	$-\frac{\sqrt{3}}{12}$	$\frac{\sqrt{3}}{6}$						
$\mathbb{Q}_{3}^{(B_{1u})}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$
	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$
	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$						
$\mathbb{Q}_{3}^{(B_{2u})}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$
	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$
	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$						
$\mathbb{Q}_{3,0}^{(E_{2u})}$	$\frac{1}{4}$	$\frac{1}{4}$	$-\frac{1}{4}$	0	$\frac{1}{4}$	$-\frac{1}{4}$	0	$\frac{1}{4}$	0	$-\frac{1}{4}$
	$-\frac{1}{4}$	0	$-\frac{1}{4}$	$\frac{1}{4}$	0	$-\frac{1}{4}$	$-\frac{1}{4}$	$\frac{1}{4}$	0	$-\frac{1}{4}$
	0	$\frac{1}{4}$	$\frac{1}{4}$	0						
$\mathbb{Q}_{3,1}^{(E_{2u})}$	$-\frac{\sqrt{3}}{12}$	$-\frac{\sqrt{3}}{12}$	$-\frac{\sqrt{3}}{12}$	$\frac{\sqrt{3}}{6}$	$-\frac{\sqrt{3}}{12}$	$-\frac{\sqrt{3}}{12}$	$\frac{\sqrt{3}}{6}$	$-\frac{\sqrt{3}}{12}$	$\frac{\sqrt{3}}{6}$	$-\frac{\sqrt{3}}{12}$
	$-\frac{\sqrt{3}}{12}$	$\frac{\sqrt{3}}{6}$	$\frac{\sqrt{3}}{12}$	$\frac{\sqrt{3}}{12}$	$-\frac{\sqrt{3}}{6}$	$\frac{\sqrt{3}}{12}$	$\frac{\sqrt{3}}{12}$	$\frac{\sqrt{3}}{12}$	$-\frac{\sqrt{3}}{6}$	$\frac{\sqrt{3}}{12}$
	$-\frac{\sqrt{3}}{6}$	$\frac{\sqrt{3}}{12}$	$\frac{\sqrt{3}}{12}$	$-\frac{\sqrt{3}}{6}$						
$\mathbb{Q}_{4}^{(B_{1g})}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$

Table 17

symbol	1	2	3	4	5	6	7	8	9	10
	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$
	$\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$						
$\mathbb{Q}_4^{(B_{2g})}$	$\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$
	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$
	$\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$						
$\mathbb{Q}_{4,0}^{(E_{2g},1)}$	$\frac{\sqrt3}{12}$	$\frac{\sqrt3}{12}$	$\frac{\sqrt3}{12}$	$-\frac{\sqrt3}{6}$	$\frac{\sqrt3}{12}$	$\frac{\sqrt3}{12}$	$-\frac{\sqrt3}{6}$	$\frac{\sqrt3}{12}$	$-\frac{\sqrt3}{6}$	$\frac{\sqrt3}{12}$
	$\frac{\sqrt3}{12}$	$-\frac{\sqrt3}{6}$	$\frac{\sqrt3}{12}$	$\frac{\sqrt3}{12}$	$-\frac{\sqrt3}{6}$	$\frac{\sqrt3}{12}$	$\frac{\sqrt3}{12}$	$\frac{\sqrt3}{12}$	$-\frac{\sqrt3}{6}$	$\frac{\sqrt3}{12}$
	$-\frac{\sqrt3}{6}$	$\frac{\sqrt3}{12}$	$\frac{\sqrt3}{12}$	$-\frac{\sqrt3}{6}$						
$\mathbb{Q}_{4,1}^{(E_{2g},1)}$	$\frac14$	$\frac14$	$-\frac14$	0	$\frac14$	$-\frac14$	0	$\frac14$	0	$-\frac14$
	$-\frac14$	0	$\frac14$	$-\frac14$	0	$\frac14$	$\frac14$	$-\frac14$	0	$\frac14$
	0	$-\frac14$	$-\frac14$	0						
$\mathbb{Q}_{5,0}^{(E_{1u},1)}$	$-\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$-\frac{\sqrt2}{8}+\frac{\sqrt6}{24}$	$-\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$\frac{\sqrt6}{12}$	$-\frac{\sqrt2}{8}-\frac{\sqrt6}{24}$	$-\frac{\sqrt2}{8}+\frac{\sqrt6}{24}$	$-\frac{\sqrt6}{12}$	$\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$\frac{\sqrt6}{12}$	$-\frac{\sqrt2}{8}-\frac{\sqrt6}{24}$
	$\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt2}{8}+\frac{\sqrt6}{24}$	$-\frac{\sqrt2}{8}+\frac{\sqrt6}{24}$	$-\frac{\sqrt6}{12}$	$\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$-\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$-\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$\frac{\sqrt6}{12}$	$-\frac{\sqrt2}{8}-\frac{\sqrt6}{24}$
	$-\frac{\sqrt6}{12}$	$\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$-\frac{\sqrt2}{8}-\frac{\sqrt6}{24}$	$\frac{\sqrt6}{12}$						
$\mathbb{Q}_{5,1}^{(E_{1u},1)}$	$-\frac{\sqrt2}{8}-\frac{\sqrt6}{24}$	$\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt2}{8}+\frac{\sqrt6}{24}$	$-\frac{\sqrt2}{8}-\frac{\sqrt6}{24}$	$\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$
	$-\frac{\sqrt2}{8}+\frac{\sqrt6}{24}$	$-\frac{\sqrt6}{12}$	$\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$-\frac{\sqrt2}{8}-\frac{\sqrt6}{24}$	$\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$-\frac{\sqrt2}{8}-\frac{\sqrt6}{24}$	$\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt2}{8}+\frac{\sqrt6}{24}$
	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt2}{8}+\frac{\sqrt6}{24}$	$-\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$\frac{\sqrt6}{12}$						
$\mathbb{Q}_{5,0}^{(E_{2u},1)}$	$\frac{\sqrt3}{12}$	$\frac{\sqrt3}{12}$	$-\frac{\sqrt3}{12}$	$\frac{\sqrt3}{6}$	$-\frac{\sqrt3}{12}$	$-\frac{\sqrt3}{12}$	$\frac{\sqrt3}{6}$	$-\frac{\sqrt3}{12}$	$-\frac{\sqrt3}{6}$	$\frac{\sqrt3}{12}$
	$\frac{\sqrt3}{12}$	$-\frac{\sqrt3}{6}$	$-\frac{\sqrt3}{12}$	$\frac{\sqrt3}{12}$	$-\frac{\sqrt3}{6}$	$\frac{\sqrt3}{12}$	$-\frac{\sqrt3}{12}$	$\frac{\sqrt3}{12}$	$-\frac{\sqrt3}{6}$	$\frac{\sqrt3}{12}$
	$\frac{\sqrt3}{6}$	$-\frac{\sqrt3}{12}$	$-\frac{\sqrt3}{12}$	$\frac{\sqrt3}{6}$						
$\mathbb{Q}_{5,1}^{(E_{2u},1)}$	$\frac14$	$\frac14$	$\frac14$	0	$-\frac14$	$\frac14$	0	$-\frac14$	0	$-\frac14$
	$-\frac14$	0	$-\frac14$	$-\frac14$	0	$\frac14$	$-\frac14$	$-\frac14$	0	$\frac14$
	0	$\frac14$	$\frac14$	0						
$\mathbb{Q}_6^{(A_{2g})}$	$\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$
	$\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{12}$
	$\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$	$\frac{\sqrt6}{12}$						
$\mathbb{Q}_{6,0}^{(E_{1g},1)}$	$-\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$-\frac{\sqrt2}{8}+\frac{\sqrt6}{24}$	$-\frac{\sqrt2}{8}+\frac{\sqrt6}{24}$	$-\frac{\sqrt6}{12}$	$\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$-\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$\frac{\sqrt6}{12}$	$-\frac{\sqrt2}{8}-\frac{\sqrt6}{24}$	$\frac{\sqrt6}{12}$	$-\frac{\sqrt2}{8}-\frac{\sqrt6}{24}$
	$\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$-\frac{\sqrt6}{12}$	$-\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$-\frac{\sqrt2}{8}+\frac{\sqrt6}{24}$	$-\frac{\sqrt6}{12}$	$\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$-\frac{\sqrt2}{8}+\frac{\sqrt6}{24}$	$-\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$\frac{\sqrt6}{12}$	$-\frac{\sqrt2}{8}-\frac{\sqrt6}{24}$
	$\frac{\sqrt6}{12}$	$-\frac{\sqrt2}{8}-\frac{\sqrt6}{24}$	$\frac{\sqrt6}{24}+\frac{\sqrt2}{8}$	$-\frac{\sqrt6}{12}$						

Table 17

symbol	1	2	3	4	5	6	7	8	9	10
$\mathbb{Q}_{6,1}^{(E_{1g},1)}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$
	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{2}}{8}-\frac{\sqrt{6}}{24}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$
	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{24}+\frac{\sqrt{2}}{8}$	$-\frac{\sqrt{2}}{8}+\frac{\sqrt{6}}{24}$	$-\frac{\sqrt{6}}{12}$						
$\mathbb{Q}_{7}^{(A_{1u})}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$
	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$
	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$						