SAMB for "GaAs"

- Group: No. 216 T_d^2 $F-43m$ [cubic]
- Associated point group: No. 31 T_d $-43m$ [cubic]

- Generation condition
    - model type: `tight_binding`
    - time-reversal type: `electric`
    - irrep: `[A1]`
    - `spinless`

- Unit cell:
    $a = 1.0,\ b = 1.0,\ c = 1.0,\ \alpha = 90.0,\ \beta = 90.0,\ \gamma = 90.0$
- Lattice vectors:
    $\boldsymbol{a}_1 = \begin{pmatrix} 1.0 & 0 & 0 \end{pmatrix}$
    $\boldsymbol{a}_2 = \begin{pmatrix} 0 & 1.0 & 0 \end{pmatrix}$
    $\boldsymbol{a}_3 = \begin{pmatrix} 0 & 0 & 1.0 \end{pmatrix}$
- Plus sets:
    $+ \begin{pmatrix} 0 & 0 & 0 \end{pmatrix}$
    $+ \begin{pmatrix} 0 & \frac{1}{2} & \frac{1}{2} \end{pmatrix}$
    $+ \begin{pmatrix} \frac{1}{2} & 0 & \frac{1}{2} \end{pmatrix}$
    $+ \begin{pmatrix} \frac{1}{2} & \frac{1}{2} & 0 \end{pmatrix}$

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 = 6

Table 2: Hilbert space for full matrix.

No.	ket	No.	ket	No.	ket	No.	ket	No.	ket
1	$p_x@\mathrm{Ga}_1$	2	$p_y@\mathrm{Ga}_1$	3	$p_z@\mathrm{Ga}_1$	4	$p_x@\mathrm{As}_1$	5	$p_y@\mathrm{As}_1$
6	$p_z@\mathrm{As}_1$								

- Sites in (primitive) unit cell:

Table 3: Site-clusters.

	site	position	mapping
S_1 [4a: -43m]	Ga_1	$\begin{pmatrix} 0 & 0 & 0 \end{pmatrix}$	[1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24]
S_2 [4c: -43m]	As_1	$\begin{pmatrix} \frac{1}{4} & \frac{1}{4} & \frac{1}{4} \end{pmatrix}$	[1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24]

- Bonds in (primitive) unit cell:

Table 4: Bond-clusters.

	bond	tail	head	n	#	$\boldsymbol{b}@\boldsymbol{c}$	mapping
B_1 [16e: .3m]	b_1	As_1	Ga_1	1	1	$\left(\frac{1}{4} \quad \frac{1}{4} \quad \frac{1}{4}\right) @ \left(\frac{1}{8} \quad \frac{1}{8} \quad \frac{1}{8}\right)$	[1,5,9,16,17,18]
	b_2	As_1	Ga_1	1	1	$\left(-\frac{1}{4} \quad -\frac{1}{4} \quad \frac{1}{4}\right) @ \left(\frac{3}{8} \quad \frac{3}{8} \quad \frac{1}{8}\right)$	[2,6,11,13,21,23]
	b_3	As_1	Ga_1	1	1	$\left(\frac{1}{4} \quad -\frac{1}{4} \quad -\frac{1}{4}\right) @ \left(\frac{1}{8} \quad \frac{3}{8} \quad \frac{3}{8}\right)$	[3,7,12,15,19,24]
	b_4	As_1	Ga_1	1	1	$\left(-\frac{1}{4} \quad \frac{1}{4} \quad -\frac{1}{4}\right) @ \left(\frac{3}{8} \quad \frac{1}{8} \quad \frac{3}{8}\right)$	[4,8,10,14,20,22]

- SAMB:

No. 1 $\hat{\mathbb{Q}}_0^{(A_1)}$ $[M_1, S_1]$

$\hat{\mathbb{Z}}_1 = \mathbb{X}_1[\mathbb{Q}_0^{(a,A_1)}] \otimes \mathbb{Y}_1[\mathbb{Q}_0^{(s,A_1)}]$

No. 2 $\hat{\mathbb{Q}}_0^{(A_1)}$ $[M_1, S_2]$

$\hat{\mathbb{Z}}_2 = \mathbb{X}_1[\mathbb{Q}_0^{(a,A_1)}] \otimes \mathbb{Y}_2[\mathbb{Q}_0^{(s,A_1)}]$

No. 3 $\hat{\mathbb{Q}}_0^{(A_1)}$ $[M_1, B_1]$

$\hat{\mathbb{Z}}_3 = \mathbb{X}_1[\mathbb{Q}_0^{(a,A_1)}] \otimes \mathbb{Y}_3[\mathbb{Q}_0^{(b,A_1)}]$

No. 4 $\hat{\mathbb{Q}}_3^{(A_1)}$ $[M_1, B_1]$

$$\hat{\mathbb{Z}}_4 = \frac{\sqrt{3}\mathbb{X}_2[\mathbb{Q}_{2,0}^{(a,T_2)}] \otimes \mathbb{Y}_4[\mathbb{Q}_{1,0}^{(b,T_2)}]}{3} + \frac{\sqrt{3}\mathbb{X}_3[\mathbb{Q}_{2,1}^{(a,T_2)}] \otimes \mathbb{Y}_5[\mathbb{Q}_{1,1}^{(b,T_2)}]}{3} + \frac{\sqrt{3}\mathbb{X}_4[\mathbb{Q}_{2,2}^{(a,T_2)}] \otimes \mathbb{Y}_6[\mathbb{Q}_{1,2}^{(b,T_2)}]}{3}$$

Table 5: Atomic SAMB group.

group	bra	ket
M_1	p_x, p_y, p_z	p_x, p_y, p_z

Table 6: Atomic SAMB.

symbol	type	group	form
$\mathbb{X}_1$	$\mathbb{Q}_0^{(a,A_1)}$	M_1	$\begin{pmatrix} \frac{\sqrt{3}}{3} & 0 & 0 \\ 0 & \frac{\sqrt{3}}{3} & 0 \\ 0 & 0 & \frac{\sqrt{3}}{3} \end{pmatrix}$

continued …

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Table 6

symbol	type	group	form
$\mathbb{X}_2$	$\mathbb{Q}_{2,0}^{(a,T_2)}$	M_1	$\begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}}{2} \\ 0 & \frac{\sqrt{2}}{2} & 0 \end{pmatrix}$
$\mathbb{X}_3$	$\mathbb{Q}_{2,1}^{(a,T_2)}$	M_1	$\begin{pmatrix} 0 & 0 & \frac{\sqrt{2}}{2} \\ 0 & 0 & 0 \\ \frac{\sqrt{2}}{2} & 0 & 0 \end{pmatrix}$
$\mathbb{X}_4$	$\mathbb{Q}_{2,2}^{(a,T_2)}$	M_1	$\begin{pmatrix} 0 & \frac{\sqrt{2}}{2} & 0 \\ \frac{\sqrt{2}}{2} & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$

Table 7: Cluster SAMB.

symbol	type	cluster	form
$\mathbb{Y}_1$	$\mathbb{Q}_0^{(s,A_1)}$	S_1	$\begin{pmatrix} 1 \end{pmatrix}$
$\mathbb{Y}_2$	$\mathbb{Q}_0^{(s,A_1)}$	S_2	$\begin{pmatrix} 1 \end{pmatrix}$
$\mathbb{Y}_3$	$\mathbb{Q}_0^{(b,A_1)}$	B_1	$\begin{pmatrix} \frac{1}{2} & \frac{1}{2} & \frac{1}{2} & \frac{1}{2} \end{pmatrix}$
$\mathbb{Y}_4$	$\mathbb{Q}_{1,0}^{(b,T_2)}$	B_1	$\begin{pmatrix} \frac{1}{2} & -\frac{1}{2} & \frac{1}{2} & -\frac{1}{2} \end{pmatrix}$
$\mathbb{Y}_5$	$\mathbb{Q}_{1,1}^{(b,T_2)}$	B_1	$\begin{pmatrix} \frac{1}{2} & -\frac{1}{2} & -\frac{1}{2} & \frac{1}{2} \end{pmatrix}$
$\mathbb{Y}_6$	$\mathbb{Q}_{1,2}^{(b,T_2)}$	B_1	$\begin{pmatrix} \frac{1}{2} & \frac{1}{2} & -\frac{1}{2} & -\frac{1}{2} \end{pmatrix}$

Table 8: Polar harmonics.

No.	symbol	rank	irrep.	mul.	comp.	form
1	$\mathbb{Q}_0^{(A_1)}$	0	A_1	$-$	$-$	1
2	$\mathbb{Q}_{1,0}^{(T_2)}$	1	T_2	$-$	0	x
3	$\mathbb{Q}_{1,1}^{(T_2)}$	1	T_2	$-$	1	y
4	$\mathbb{Q}_{1,2}^{(T_2)}$	1	T_2	$-$	2	z
5	$\mathbb{Q}_{2,0}^{(T_2)}$	2	T_2	$-$	0	$\sqrt{3}yz$
6	$\mathbb{Q}_{2,1}^{(T_2)}$	2	T_2	$-$	1	$\sqrt{3}xz$
7	$\mathbb{Q}_{2,2}^{(T_2)}$	2	T_2	$-$	2	$\sqrt{3}xy$

- Group info.: Generator = $\{2_{001}|0\}$, $\{2_{010}|0\}$, $\{3_{111}^+|0\}$, $\{m_{1-10}|0\}$

Table 9: Conjugacy class (point-group part).

rep. SO	symmetry operations
$\{1|0\}$	$\{1|0\}$
$\{2_{001}|0\}$	$\{2_{001}|0\}$, $\{2_{100}|0\}$, $\{2_{010}|0\}$
$\{3_{111}^+|0\}$	$\{3_{111}^+|0\}$, $\{3_{1-1-1}^+|0\}$, $\{3_{-11-1}^+|0\}$, $\{3_{-1-11}^+|0\}$, $\{3_{111}^-|0\}$, $\{3_{1-1-1}^-|0\}$, $\{3_{-11-1}^-|0\}$, $\{3_{-1-11}^-|0\}$
$\{m_{110}|0\}$	$\{m_{110}|0\}$, $\{m_{101}|0\}$, $\{m_{011}|0\}$, $\{m_{1-10}|0\}$, $\{m_{-101}|0\}$, $\{m_{01-1}|0\}$
$\{-4_{001}^+|0\}$	$\{-4_{001}^+|0\}$, $\{-4_{100}^+|0\}$, $\{-4_{010}^+|0\}$, $\{-4_{001}^-|0\}$, $\{-4_{100}^-|0\}$, $\{-4_{010}^-|0\}$

Table 10: Symmetry operations.

No.	SO	No.	SO	No.	SO	No.	SO	No.	SO
1	$\{1|0\}$	2	$\{2_{001}|0\}$	3	$\{2_{100}|0\}$	4	$\{2_{010}|0\}$	5	$\{3_{111}^+|0\}$
6	$\{3_{1-1-1}^+|0\}$	7	$\{3_{-11-1}^+|0\}$	8	$\{3_{-1-11}^+|0\}$	9	$\{3_{111}^-|0\}$	10	$\{3_{1-1-1}^-|0\}$

continued ...

Table 10

No.	SO	No.	SO	No.	SO	No.	SO	No.	SO
11	$\{3^-_{-11-1}\|0\}$	12	$\{3^-_{-1-11}\|0\}$	13	$\{m_{110}\|0\}$	14	$\{m_{101}\|0\}$	15	$\{m_{011}\|0\}$
16	$\{m_{1-10}\|0\}$	17	$\{m_{-101}\|0\}$	18	$\{m_{01-1}\|0\}$	19	$\{-4^+_{001}\|0\}$	20	$\{-4^+_{100}\|0\}$
21	$\{-4^+_{010}\|0\}$	22	$\{-4^-_{001}\|0\}$	23	$\{-4^-_{100}\|0\}$	24	$\{-4^-_{010}\|0\}$		

Table 11: Character table (point-group part).

	1	2_{001}	3^+_{111}	m_{110}	-4^+_{001}
A_1	1	1	1	1	1
A_2	1	1	1	-1	-1
E	2	2	-1	0	0
T_1	3	-1	0	-1	1
T_2	3	-1	0	1	-1

Table 12: Parity conversion.

$\leftrightarrow$	$\leftrightarrow$	$\leftrightarrow$	$\leftrightarrow$	$\leftrightarrow$
$A_1\ (A_2)$	$A_2\ (A_1)$	$E\ (E)$	$T_1\ (T_2)$	$T_2\ (T_1)$

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

	A_1	A_2	E	T_1	T_2
A_1	A_1	A_2	E	T_1	T_2
A_2		A_1	E	T_2	T_1
E			$A_1 + E$	$T_1 + T_2$	$T_1 + T_2$
T_1				$A_1 + E + T_2$	$A_2 + E + T_1 + T_2$
T_2					$A_1 + E + T_2$

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

A_1	A_2	E	T_1	T_2
$-$	$-$	A_2	T_1	T_1

Table 15: Virtual-cluster sites.

No.	position	No.	position	No.	position	No.	position
1	$\begin{pmatrix} 2 & 1 & 0 \end{pmatrix}$	2	$\begin{pmatrix} -2 & -1 & 0 \end{pmatrix}$	3	$\begin{pmatrix} 2 & -1 & 0 \end{pmatrix}$	4	$\begin{pmatrix} -2 & 1 & 0 \end{pmatrix}$
5	$\begin{pmatrix} 0 & 2 & 1 \end{pmatrix}$	6	$\begin{pmatrix} 0 & -2 & 1 \end{pmatrix}$	7	$\begin{pmatrix} 0 & -2 & -1 \end{pmatrix}$	8	$\begin{pmatrix} 0 & 2 & -1 \end{pmatrix}$
9	$\begin{pmatrix} 1 & 0 & 2 \end{pmatrix}$	10	$\begin{pmatrix} -1 & 0 & -2 \end{pmatrix}$	11	$\begin{pmatrix} -1 & 0 & 2 \end{pmatrix}$	12	$\begin{pmatrix} 1 & 0 & -2 \end{pmatrix}$
13	$\begin{pmatrix} -1 & -2 & 0 \end{pmatrix}$	14	$\begin{pmatrix} 0 & 1 & -2 \end{pmatrix}$	15	$\begin{pmatrix} 2 & 0 & -1 \end{pmatrix}$	16	$\begin{pmatrix} 1 & 2 & 0 \end{pmatrix}$
17	$\begin{pmatrix} 0 & 1 & 2 \end{pmatrix}$	18	$\begin{pmatrix} 2 & 0 & 1 \end{pmatrix}$	19	$\begin{pmatrix} 1 & -2 & 0 \end{pmatrix}$	20	$\begin{pmatrix} -2 & 0 & -1 \end{pmatrix}$
21	$\begin{pmatrix} 0 & -1 & 2 \end{pmatrix}$	22	$\begin{pmatrix} -1 & 2 & 0 \end{pmatrix}$	23	$\begin{pmatrix} -2 & 0 & 1 \end{pmatrix}$	24	$\begin{pmatrix} 0 & -1 & -2 \end{pmatrix}$

Table 16: Virtual-cluster basis.

symbol	1	2	3	4	5	6	7	8	9	10
$\mathbb{Q}_0^{(A_1)}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$
	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$
	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$						
$\mathbb{Q}_{1,0}^{(T_2)}$	$\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{10}$	0	0	0	0	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$
	$-\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$	0	$\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{20}$	0	$\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{10}$
	0	$-\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{10}$	0						
$\mathbb{Q}_{1,1}^{(T_2)}$	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{10}$	0	0
	0	0	$-\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{20}$	0	$\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{20}$	0	$-\frac{\sqrt{10}}{10}$	0

Table 16

symbol	1	2	3	4	5	6	7	8	9	10
	$-\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{10}$	0	$-\frac{\sqrt{10}}{20}$						
$\mathbb{Q}_{1,2}^{(T_2)}$	0	0	0	0	$\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{10}$
	$\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{10}$	0	$-\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{20}$	0	$\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{20}$	0	$-\frac{\sqrt{10}}{20}$
	$\frac{\sqrt{10}}{10}$	0	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{10}$						
$\mathbb{Q}_{2,0}^{(E)}$	$-\frac{5\sqrt{39}}{156}$	$-\frac{5\sqrt{39}}{156}$	$-\frac{5\sqrt{39}}{156}$	$-\frac{5\sqrt{39}}{156}$	$-\frac{\sqrt{39}}{78}$	$-\frac{\sqrt{39}}{78}$	$-\frac{\sqrt{39}}{78}$	$-\frac{\sqrt{39}}{78}$	$\frac{7\sqrt{39}}{156}$	$\frac{7\sqrt{39}}{156}$
	$\frac{7\sqrt{39}}{156}$	$\frac{7\sqrt{39}}{156}$	$-\frac{5\sqrt{39}}{156}$	$\frac{7\sqrt{39}}{156}$	$-\frac{\sqrt{39}}{78}$	$-\frac{5\sqrt{39}}{156}$	$\frac{7\sqrt{39}}{156}$	$-\frac{\sqrt{39}}{78}$	$-\frac{5\sqrt{39}}{156}$	$-\frac{\sqrt{39}}{78}$
	$\frac{7\sqrt{39}}{156}$	$-\frac{5\sqrt{39}}{156}$	$-\frac{\sqrt{39}}{78}$	$\frac{7\sqrt{39}}{156}$						
$\mathbb{Q}_{2,1}^{(E)}$	$\frac{3\sqrt{13}}{52}$	$\frac{3\sqrt{13}}{52}$	$\frac{3\sqrt{13}}{52}$	$\frac{3\sqrt{13}}{52}$	$-\frac{\sqrt{13}}{13}$	$-\frac{\sqrt{13}}{13}$	$-\frac{\sqrt{13}}{13}$	$-\frac{\sqrt{13}}{13}$	$\frac{\sqrt{13}}{52}$	$\frac{\sqrt{13}}{52}$
	$\frac{\sqrt{13}}{52}$	$\frac{\sqrt{13}}{52}$	$-\frac{3\sqrt{13}}{52}$	$-\frac{\sqrt{13}}{52}$	$\frac{\sqrt{13}}{13}$	$-\frac{3\sqrt{13}}{52}$	$-\frac{\sqrt{13}}{52}$	$\frac{\sqrt{13}}{13}$	$-\frac{3\sqrt{13}}{52}$	$\frac{\sqrt{13}}{13}$
	$-\frac{\sqrt{13}}{52}$	$-\frac{3\sqrt{13}}{52}$	$\frac{\sqrt{13}}{13}$	$-\frac{\sqrt{13}}{52}$						
$\mathbb{Q}_{2,0}^{(T_2)}$	0	0	0	0	$\frac{\sqrt{2}}{4}$	$-\frac{\sqrt{2}}{4}$	$\frac{\sqrt{2}}{4}$	$-\frac{\sqrt{2}}{4}$	0	0
	0	0	0	$-\frac{\sqrt{2}}{4}$	0	0	$\frac{\sqrt{2}}{4}$	0	0	0
	$-\frac{\sqrt{2}}{4}$	0	0	$\frac{\sqrt{2}}{4}$						
$\mathbb{Q}_{2,1}^{(T_2)}$	0	0	0	0	0	0	0	0	$\frac{\sqrt{2}}{4}$	$\frac{\sqrt{2}}{4}$
	$-\frac{\sqrt{2}}{4}$	$-\frac{\sqrt{2}}{4}$	0	0	$-\frac{\sqrt{2}}{4}$	0	0	$\frac{\sqrt{2}}{4}$	0	$\frac{\sqrt{2}}{4}$
	0	0	$-\frac{\sqrt{2}}{4}$	0						
$\mathbb{Q}_{2,2}^{(T_2)}$	$\frac{\sqrt{2}}{4}$	$\frac{\sqrt{2}}{4}$	$-\frac{\sqrt{2}}{4}$	$-\frac{\sqrt{2}}{4}$	0	0	0	0	0	0
	0	0	$\frac{\sqrt{2}}{4}$	0	0	$\frac{\sqrt{2}}{4}$	0	0	$-\frac{\sqrt{2}}{4}$	0
	0	$-\frac{\sqrt{2}}{4}$	0	0						
$\mathbb{Q}_{3,0}^{(T_1)}$	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$	0	0	0	0	$-\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{10}$
	$\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{10}$	0	$-\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{10}$	0	$-\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{20}$
	0	$-\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{20}$	0						
$\mathbb{Q}_{3,1}^{(T_1)}$	$-\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{20}$	0	0
	0	0	$\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{10}$	0	$-\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{10}$	0	$\frac{\sqrt{10}}{20}$	0
	$-\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{20}$	0	$-\frac{\sqrt{10}}{10}$						
$\mathbb{Q}_{3,2}^{(T_1)}$	0	0	0	0	$-\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$
	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$	0	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{10}$	0	$-\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{10}$	0	$-\frac{\sqrt{10}}{10}$
	$-\frac{\sqrt{10}}{20}$	0	$\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{20}$						
$\mathbb{Q}_{3,0}^{(T_2)}$	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$	0	0	0	0	$-\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{10}$

Table 16

symbol	1	2	3	4	5	6	7	8	9	10
	$\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{10}$	0	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{10}$	0	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{20}$
	0	$\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{20}$	0						
$\mathbb{Q}_{3,1}^{(T_2)}$	$-\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{20}$	0	0
	0	0	$-\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{10}$	0	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{10}$	0	$-\frac{\sqrt{10}}{20}$	0
	$\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{20}$	0	$\frac{\sqrt{10}}{10}$						
$\mathbb{Q}_{3,2}^{(T_2)}$	0	0	0	0	$-\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$
	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$	0	$-\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{10}$	0	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{10}$	0	$\frac{\sqrt{10}}{10}$
	$\frac{\sqrt{10}}{20}$	0	$-\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{20}$						
$\mathbb{Q}_{4,0}^{(E)}$	$\frac{3\sqrt{13}}{52}$	$\frac{3\sqrt{13}}{52}$	$\frac{3\sqrt{13}}{52}$	$\frac{3\sqrt{13}}{52}$	$-\frac{\sqrt{13}}{13}$	$-\frac{\sqrt{13}}{13}$	$-\frac{\sqrt{13}}{13}$	$-\frac{\sqrt{13}}{13}$	$\frac{\sqrt{13}}{52}$	$\frac{\sqrt{13}}{52}$
	$\frac{\sqrt{13}}{52}$	$\frac{\sqrt{13}}{52}$	$\frac{3\sqrt{13}}{52}$	$\frac{\sqrt{13}}{52}$	$-\frac{\sqrt{13}}{13}$	$\frac{3\sqrt{13}}{52}$	$\frac{\sqrt{13}}{52}$	$-\frac{\sqrt{13}}{13}$	$\frac{3\sqrt{13}}{52}$	$-\frac{\sqrt{13}}{13}$
	$\frac{\sqrt{13}}{52}$	$\frac{3\sqrt{13}}{52}$	$-\frac{\sqrt{13}}{13}$	$\frac{\sqrt{13}}{52}$						
$\mathbb{Q}_{4,1}^{(E)}$	$\frac{5\sqrt{39}}{156}$	$\frac{5\sqrt{39}}{156}$	$\frac{5\sqrt{39}}{156}$	$\frac{5\sqrt{39}}{156}$	$\frac{\sqrt{39}}{78}$	$\frac{\sqrt{39}}{78}$	$\frac{\sqrt{39}}{78}$	$\frac{\sqrt{39}}{78}$	$-\frac{7\sqrt{39}}{156}$	$-\frac{7\sqrt{39}}{156}$
	$-\frac{7\sqrt{39}}{156}$	$-\frac{7\sqrt{39}}{156}$	$-\frac{5\sqrt{39}}{156}$	$\frac{7\sqrt{39}}{156}$	$-\frac{\sqrt{39}}{78}$	$-\frac{5\sqrt{39}}{156}$	$\frac{7\sqrt{39}}{156}$	$-\frac{\sqrt{39}}{78}$	$-\frac{5\sqrt{39}}{156}$	$-\frac{\sqrt{39}}{78}$
	$\frac{7\sqrt{39}}{156}$	$-\frac{5\sqrt{39}}{156}$	$-\frac{\sqrt{39}}{78}$	$\frac{7\sqrt{39}}{156}$						
$\mathbb{Q}_{4,0}^{(T_1)}$	0	0	0	0	$\frac{\sqrt{2}}{4}$	$-\frac{\sqrt{2}}{4}$	$\frac{\sqrt{2}}{4}$	$-\frac{\sqrt{2}}{4}$	0	0
	0	0	0	$\frac{\sqrt{2}}{4}$	0	0	$-\frac{\sqrt{2}}{4}$	0	0	0
	$\frac{\sqrt{2}}{4}$	0	0	$-\frac{\sqrt{2}}{4}$						
$\mathbb{Q}_{4,1}^{(T_1)}$	0	0	0	0	0	0	0	0	$\frac{\sqrt{2}}{4}$	$\frac{\sqrt{2}}{4}$
	$-\frac{\sqrt{2}}{4}$	$-\frac{\sqrt{2}}{4}$	0	0	$\frac{\sqrt{2}}{4}$	0	0	$-\frac{\sqrt{2}}{4}$	0	$-\frac{\sqrt{2}}{4}$
	0	0	$\frac{\sqrt{2}}{4}$	0						
$\mathbb{Q}_{4,2}^{(T_1)}$	$\frac{\sqrt{2}}{4}$	$\frac{\sqrt{2}}{4}$	$-\frac{\sqrt{2}}{4}$	$-\frac{\sqrt{2}}{4}$	0	0	0	0	0	0
	0	0	$-\frac{\sqrt{2}}{4}$	0	0	$-\frac{\sqrt{2}}{4}$	0	0	$\frac{\sqrt{2}}{4}$	0
	0	$\frac{\sqrt{2}}{4}$	0	0						
$\mathbb{Q}_{5,0}^{(T_1)}$	$\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{10}$	0	0	0	0	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$
	$-\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{20}$	0	$-\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{20}$	0	$-\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{10}$
	0	$\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{10}$	0						
$\mathbb{Q}_{5,1}^{(T_1)}$	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{10}$	0	0
	0	0	$\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{20}$	0	$-\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{20}$	0	$\frac{\sqrt{10}}{10}$	0
	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{10}$	0	$\frac{\sqrt{10}}{20}$						

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Table 16

symbol	1	2	3	4	5	6	7	8	9	10
$\mathbb{Q}_{5,2}^{(T_1)}$	0	0	0	0	$\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$	$-\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{10}$
	$\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{10}$	0	$\frac{\sqrt{10}}{10}$	$\frac{\sqrt{10}}{20}$	0	$-\frac{\sqrt{10}}{10}$	$-\frac{\sqrt{10}}{20}$	0	$\frac{\sqrt{10}}{20}$
	$-\frac{\sqrt{10}}{10}$	0	$-\frac{\sqrt{10}}{20}$	$\frac{\sqrt{10}}{10}$						
$\mathbb{Q}_{6}^{(A_2)}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$
	$\frac{\sqrt{6}}{12}$	$\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$
	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$	$-\frac{\sqrt{6}}{12}$						