Appendix A.
Details of the calculation of the phase functions associated with Γ_e
[Not to be included in the printed version of the paper]

We give here the proofs for the results quoted in Section 4..

A.1. Constraints imposed by δ (all point groups)

R1. For any $\gamma \in \Gamma_e$, if δ commutes with γ ($\delta\gamma\delta^{-1} = \gamma$) and the 8-fold generator is r_8, then the in-plane phases of Φ_e^γ are

$$\Phi_e^\gamma(\mathbf{b}^{(i)}) \equiv \begin{cases} aaaa & V\text{-lattice}, \\ 0000 & S\text{-lattice}, \end{cases} \qquad \text{(A-1)}$$

where a is either 0 or 1/2.

If the 8-fold generator is $\bar{r}_8$ the in-plane phases of Φ_e^γ are

$$\Phi_e^\gamma(\mathbf{b}^{(i)}) \equiv aaaa \qquad \text{(A-2a)}$$

regardless of the lattice type, and the phase on the stacking vector is

$$\Phi_e^\gamma(\mathbf{c}) \equiv \begin{cases} c & V\text{-lattice}, \\ \frac{a}{2} + c & S\text{-lattice}, \end{cases} \qquad \text{(A-2b)}$$

where a and c are either 0 or 1/2 but they cannot both be 0. As a consequence, on vertical lattices γ is an operation of order 2, and on staggered lattices γ is of order 2 or 4 depending on whether $a \equiv 0$ or 1/2.

Proof: From application of relation (3) to the horizontal generating vectors we obtain

$$\Phi_e^\gamma(\mathbf{b}^{(i)}) \equiv \Phi_e^{\delta\gamma\delta^{-1}}(g_8\mathbf{b}^{(i)}) \equiv \pm\,\Phi_e^\gamma(\mathbf{b}^{(i+1)}), \qquad \text{(A-3)}$$

where the upper (positive) sign is for $g_8 = r_8$ and the lower (negative) sign (due to the linearity of the phase function) is for $g_8 = \bar{r}_8$. This implies that on V-lattices the two phases a and b in (5) are equal. Application of (3) to the vertical stacking vector yields (with the same sign convention)

$$\Phi_e^\gamma(\mathbf{z}) \equiv \pm\,\Phi_e^\gamma(\mathbf{z}). \qquad \text{(A-4)}$$

This implies for V-lattices that if $g_8 = \bar{r}_8$ the phase $\Phi_e^\gamma(\mathbf{z}) \equiv 0$ or 1/2 and therefore that γ is an operation of order 2. For the staggered stacking vector, with the aid of Table 2, we obtain

$$\Phi_e^\gamma(\mathbf{z}+\mathbf{h}) \equiv \pm\,\Phi_e^\gamma(\mathbf{z}+\mathbf{h}) \pm a, \qquad \text{(A-5)}$$

implying for S-lattices that if $g_8 = r_8$ the phase a in (5) is 0, and if $g_8 = \bar{r}_8$ then $2\Phi_e^\gamma(\mathbf{z}+\mathbf{h}) \equiv a$, whose solutions are given by Eq. (A-2b), and γ is an operation of order 2 or 4 depending on whether $a \equiv 0$ or 1/2.

R2. If $\gamma \in \Gamma_e$, is an operation of order $n > 2$, $\delta\gamma\delta^{-1} = \gamma^{-1}$, and the 8-fold generator is r_8, then the lattice must be staggered, n must be 4, and the phases of Φ_e^γ are

$$\Phi_e^\gamma(\mathbf{b}^{(i)}) \equiv \frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}, \quad \Phi_e^\gamma(\mathbf{z}+\mathbf{h}) \equiv \frac{1}{4} \text{ or } \frac{3}{4}. \qquad \text{(A-6)}$$

If the 8-fold generator is $\bar{r}_8$ the in-plane phases of Φ_e^γ are

$$\Phi_e^\gamma(\mathbf{b}^{(i)}) \equiv \begin{cases} aaaa & V\text{-lattice}, \\ 0000 & S\text{-lattice}, \end{cases} \qquad \text{(A-7)}$$

where a is either 0 or 1/2.

Proof: Application of (3) to the horizontal generating vectors shows again that on V-lattices the two phases a and b in (5) are equal. Application of (3) to the vertical stacking vector yields

$$\Phi_e^\gamma(\mathbf{z}) \equiv \Phi_e^{\gamma^{-1}}(g_8\mathbf{z}) \equiv \mp\,\Phi_e^\gamma(\mathbf{z}), \qquad \text{(A-8)}$$

where the upper (negative) sign is for $g_8 = r_8$ and the lower (positive) sign is for $g_8 = \bar{r}_8$. This implies that on V-lattices if $g_8 = r_8$ the phase $\Phi_e^\gamma(\mathbf{z})$ is 0 or 1/2. If this is the case, then because we know that the in-plane phases of Φ_e^γ are also either 0 or 1/2, $\gamma^2 = \epsilon$ in contradiction to the statement that the order of γ is greater than 2, and therefore the lattice cannot be vertical.

For the staggered stacking vector we obtain (with the same sign convention)

$$\Phi_e^\gamma(\mathbf{z}+\mathbf{h}) \equiv \mp\,\Phi_e^\gamma(\mathbf{z}+\mathbf{h}) \mp a, \qquad \text{(A-9)}$$

implying for S-lattices that if $g_8 = \bar{r}_8$ the phase a in (5) is 0, and if $g_8 = r_8$ then $2\Phi_e^\gamma(\mathbf{z}+\mathbf{h}) \equiv a$. If $a \equiv 0$ then all the phases of Φ_e^γ are either 0 or 1/2 implying that γ is of order 2, and therefore we must take $a \equiv 1/2$, in which case γ is of order 4, and $\Phi_e^\gamma(\mathbf{z}+\mathbf{h}) \equiv 1/4$ or 3/4.

R3. If $2^*_{\bar{x}}, 2^*_{\bar{y}} \in \Gamma_e$, where the asterisk denotes an optional prime, and $\delta 2^*_{\bar{x}}\delta^{-1} = 2^*_{\bar{y}}$, the directions of the $\bar{x}$ and $\bar{y}$ axes in spin-space can be chosen so that the in-plane phases of $\Phi_e^{2^*_{\bar{x}}}$ and $\Phi_e^{2^*_{\bar{y}}}$ are

$$\begin{cases} \Phi_e^{2^*_{\bar{x}}}(\mathbf{b}^{(i)}) \equiv 0\tfrac{1}{2}0\tfrac{1}{2},\ \Phi_e^{2^*_{\bar{y}}}(\mathbf{b}^{(i)}) \equiv \tfrac{1}{2}0\tfrac{1}{2}0 & V\text{-lattice}, \\ \Phi_e^{2^*_{\bar{x}}}(\mathbf{b}^{(i)}) \equiv \Phi_e^{2^*_{\bar{y}}}(\mathbf{b}^{(i)}) \equiv \tfrac{1}{2}\tfrac{1}{2}\tfrac{1}{2}\tfrac{1}{2} & S\text{-lattice}, \end{cases} \qquad \text{(A-10a)}$$

and the phases on the stacking vector are

$$\begin{cases} \Phi_e^{2^*_{\bar{x}}}(\mathbf{z}) \equiv \Phi_e^{2^*_{\bar{y}}}(\mathbf{z}) \equiv 0 \text{ or } \tfrac{1}{2} & V\text{-lattice}, \\ \Phi_e^{2^*_{\bar{x}}}(\mathbf{z}+\mathbf{h}) \equiv 0,\ \Phi_e^{2^*_{\bar{y}}}(\mathbf{z}+\mathbf{h}) \equiv \tfrac{1}{2} & S\text{-lattice}. \end{cases} \qquad \text{(A-10b)}$$

Proof: Let γ_1 and γ_2 denote the two 2-fold operations, and note that since the phases $\Phi_e^{\gamma_1}(\mathbf{k})$ and $\Phi_e^{\gamma_2}(\mathbf{k})$ are always either 0 or 1/2 the signs of these phases can be ignored. Application of Eq. (3) to the horizontal generating vectors yields

$$\Phi_e^{\gamma_1}(\mathbf{b}^{(i)}) \equiv \Phi_e^{\delta\gamma_1\delta^{-1}}(g_8\mathbf{b}^{(i)}) \equiv \Phi_e^{\gamma_2}(\pm\mathbf{b}^{(i+1)}), \qquad \text{(A-11)}$$

This implies through result R1 that on V-lattices if $\Phi_e^{\gamma_1}(\mathbf{b}^{(i)}) \equiv abab$ then $\Phi_e^{\gamma_2}(\mathbf{b}^{(i)}) \equiv baba$, and that on S-lattices $\Phi_e^{\gamma_1}(\mathbf{b}^{(i)}) \equiv \Phi_e^{\gamma_2}(\mathbf{b}^{(i)}) \equiv aaaa$, where a and b are either 0 or 1/2.

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Application of Eq. (3) to the vertical stacking vector yields

$$\Phi_e^{\gamma_1}(\mathbf{z}) \equiv \Phi_e^{\delta\gamma_1\delta^{-1}}(g_8\mathbf{z}) \equiv \Phi_e^{\gamma_2}(\mathbf{z}), \quad \text{(A-12)}$$

where we have ignored the sign difference between $r_8\mathbf{z}$ and $\bar{r}_8\mathbf{z}$. This equality of phases implies that a and b cannot be equal otherwise $\gamma_1 = \gamma_2$. We can always choose the orientation of the $\bar{x}$ and $\bar{y}$ axes in spin space such that the phase function associated with $2^*_{\bar{x}}$ is the one whose values on the horizontal generating vectors are $0\frac{1}{2}0\frac{1}{2}$.

Finally, application of Eq. (3) to the staggered stacking vector, ignoring again the sign difference between $r_8(\mathbf{z}+\mathbf{h})$ and $\bar{r}_8(\mathbf{z}+\mathbf{h})$, yields

$$\Phi_e^{\gamma_1}(\mathbf{z}+\mathbf{h}) \equiv \Phi_e^{\gamma_2}(\mathbf{z}+\mathbf{h}) + a. \quad \text{(A-13)}$$

Since the two phase functions have identical values on the horizontal sublattice they must differ on the stacking vector. This requires that a be 1/2. Here we can always choose the orientation of the $\bar{x}$ and $\bar{y}$ axes in spin space such that the phase function associated with $2^*_{\bar{x}}$ is the one whose value on the staggered stacking vector is 0.

A.2. Constraints imposed by μ (point groups $8mm$, $\bar{8}m2$, and $8/mmm$)

Using the third line of Table 2, summarizing the effect of the mirror m on the lattice generating vectors, we obtain the following results:

M1. For any $\gamma \in \Gamma_e$, if μ commutes with γ, the in-plane phases of Φ_e^{γ} are

$$\Phi_e^{\gamma}(\mathbf{b}^{(i)}) \equiv \begin{cases} abab & V\text{-lattice}, \\ 0000 & S\text{-lattice}, \end{cases} \quad \text{(A-14)}$$

where a and b are independently either 0 or 1/2.

Proof: Starting from the general result R0, we see that no further constraints arise from application of (3) to the horizontal generating vectors and to the vertical stacking vector, and so there is no change from the general case for V-lattices. For the staggered stacking vector we obtain

$$\Phi_e^{\gamma}(\mathbf{z}+\mathbf{h}) \equiv \Phi_e^{\gamma}(\mathbf{z}+\mathbf{h}) - a, \quad \text{(A-15)}$$

implying that on S-lattices the phase a in (5) is 0.

M2. If $\gamma \in \Gamma_e$, is an operation of order $n > 2$, and $\mu\gamma\mu^{-1} = \gamma^{-1}$, then the lattice must be staggered, n must be 4, and the phases of Φ_e^{γ} are

$$\Phi_e^{\gamma}(\mathbf{b}^{(i)}) \equiv \frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}, \quad \Phi_e^{\gamma}(\mathbf{z}+\mathbf{h}) \equiv \frac{1}{4} \text{ or } \frac{3}{4}. \quad \text{(A-16)}$$

Proof: From result R0 we know that the in-plane phases of Φ_e^{γ} are either 0 or 1/2. Application of (3) to the vertical stacking vector yields an expression similar to Eq. (A-8) for r_8, implying that the phase of $\Phi_e^{\gamma}(\mathbf{z})$ is also 0 or 1/2. If this is the case then $\gamma^2 = \epsilon$ in contradiction to the statement that the order of γ is greater than 2. The only possibility that is left is for an S-lattice, in which case application of (3) to the staggered stacking vector yields an expression similar to Eq. (A-9) for r_8 and therefore to the same phases obtained in result R2 [Eq. (A-6)].

M3. If $2^*_{\bar{x}}, 2^*_{\bar{y}} \in \Gamma_e$, where the asterisk denotes an optional prime, $\mu 2^*_{\bar{x}}\mu^{-1} = 2^*_{\bar{y}}$, and the mirror is of type m, then the lattice must be staggered, the in-plane phases of $\Phi_e^{2^*_{\bar{x}}}$ and $\Phi_e^{2^*_{\bar{y}}}$ are

$$\Phi_e^{2^*_{\bar{x}}}(\mathbf{b}^{(i)}) \equiv \Phi_e^{2^*_{\bar{y}}}(\mathbf{b}^{(i)}) \equiv \frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}, \quad \text{(A-17a)}$$

and the directions of the $\bar{x}$ and $\bar{y}$ axes in spin-space can be chosen so that the phases on the staggered stacking vector are

$$\Phi_e^{2^*_{\bar{x}}}(\mathbf{z}+\mathbf{h}) \equiv 0, \ \Phi_e^{2^*_{\bar{y}}}(\mathbf{z}+\mathbf{h}) \equiv \frac{1}{2}. \quad \text{(A-17b)}$$

Proof: Let γ_1 and γ_2 denote the two 2-fold operations, and note that since the phases $\Phi_e^{\gamma_1}(\mathbf{k})$ and $\Phi_e^{\gamma_2}(\mathbf{k})$ are always either 0 or 1/2 the signs of these phases can be ignored. Application of Eq. (3) to the horizontal generating vectors yields

$$\Phi_e^{\gamma_1}(\mathbf{b}^{(i)}) \equiv \Phi_e^{\gamma_2}(\mathbf{b}^{(i+2k)}), \quad \text{(A-18)}$$

for some integer k that depends on i. Together with result R1, Eq. (A-18) implies that the two phase functions are identical on the horizontal sublattice. Application of Eq. (3) to the vertical stacking vector establishes that the two phase functions are identical everywhere in contradiction with the fact that $\gamma_1 \neq \gamma_2$, and therefore that the lattice cannot be vertical. Application of Eq. (3) to the staggered stacking vector yields

$$\Phi_e^{\gamma_1}(\mathbf{z}+\mathbf{h}) \equiv \Phi_e^{\gamma_2}(\mathbf{z}+\mathbf{h}) + a. \quad \text{(A-19)}$$

Since the two phase functions have identical values on the horizontal sublattice they must differ on the stacking vector, requiring that a be 1/2. We then choose the orientation of the $\bar{x}$ and $\bar{y}$ axes in spin space such that the phase function associated with $2^*_{\bar{x}}$ is the one whose value on the staggered stacking vector is 0.

A.3. Constraints imposed by α (point groups 822 and $\bar{8}2m$)

Using the fourth line of Table 2, summarizing the effect of the dihedral rotation d on the lattice generating vectors, we obtain the following results:

D1. For any $\gamma \in \Gamma_e$, if α commutes with γ the in-plane phases are the general ones given in result R0 [Eq. (5)]. If the lattice is vertical, the phase of $\Phi_e^{\gamma}(\mathbf{z})$ is independently 0 or 1/2, implying that γ is an operation of order 2. If the lattice is staggered the phase on the stacking vector is

$$\Phi_e^{\gamma}(\mathbf{z}+\mathbf{h}) \equiv \frac{a}{2} + c, \quad \text{(A-20)}$$

where a is the in-plane phase in (5), and $c \equiv 0$ or 1/2 but a and c cannot both be 0. Consequently, γ is an operation of order 2 or 4, depending on whether $a \equiv 0$ or 1/2.

Proof: Application of Eq. (3) to the horizontal generating vectors yields no further constraints beyond the general result R0. Application of Eq. (3) to the vertical stacking vector yields

$$\Phi_e^\gamma(\mathbf{z}) \equiv -\Phi_e^\gamma(\mathbf{z}), \quad \text{(A-21)}$$

implying that the phase of $\Phi_e^\gamma(\mathbf{z})$ is 0 or 1/2. If this is the case then γ is necessarily an operation of order 2. Application of Eq. (3) to the vertical stacking vector yields

$$\Phi_e^\gamma(\mathbf{z}+\mathbf{h}) \equiv -\Phi_e^\gamma(\mathbf{z}+\mathbf{h}) + \Phi_e^\gamma(2\mathbf{h}) - a. \quad \text{(A-22)}$$

It follows from the general result R1 that $\Phi_e^\gamma(2\mathbf{h}) \equiv \Phi_e^\gamma(\mathbf{b}^{(1)} + \mathbf{b}^{(2)} + \mathbf{b}^{(3)} - \mathbf{b}^{(4)}) \equiv 0$, and therefore that $2\Phi_e^\gamma(\mathbf{z}+\mathbf{h}) \equiv a$, whose solutions are given by Eq. (A-20). If $a \equiv 0$ then γ is again of order 2; If $a \equiv 1/2$ then γ is of order 4.

D2. If $\gamma \in \Gamma_e$, is an operation of order $n > 2$, $\alpha\gamma\alpha^{-1} = \gamma^{-1}$, and the lattice is vertical there are no additional constraints on the phase function Φ_e^γ. If the lattice is staggered then the in-plane phases of Φ_e^γ are all 0.

Proof: This can easily be seen by applying Eq. (3) to the generating vectors while noting that $\Phi_e^\gamma(2\mathbf{h}) \equiv 0$.

D3. If $2_x^*, 2_y^* \in \Gamma_e$, where the asterisk denotes an optional prime, and $\alpha 2_x^* \alpha^{-1} = 2_y^*$, then the lattice must be staggered, the in-plane phases of $\Phi_e^{2_x^*}$ and $\Phi_e^{2_y^*}$ are

$$\Phi_e^{2_x^*}(\mathbf{b}^{(i)}) \equiv \Phi_e^{2_y^*}(\mathbf{b}^{(i)}) \equiv \frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}, \quad \text{(A-23)}$$

and the directions of the $\bar{x}$ and $\bar{y}$ axes in spin-space can be chosen so that the phases on the staggered stacking vector are

$$\Phi_e^{2_x^*}(\mathbf{c}) \equiv 0, \ \Phi_e^{2_y^*}(\mathbf{c}) \equiv \frac{1}{2}. \quad \text{(A-24)}$$

Proof: This result is established in the same way as result M3 for the mirror *m* due to the fact that the sign of the phases can be ignored and the fact that $\Phi_e^\gamma(2\mathbf{h}) \equiv 0$.

A.4. Constraints imposed by η (point groups $8/m$ and $8/mmm$)

Finally, using the fifth line of Table 2, summarizing the effect of the horizontal mirror *h* on the lattice generating vectors, we obtain the following results:

H1. For any $\gamma \in \Gamma_e$, if η commutes with γ, then the phase of Φ_e^γ on the stacking vector is

$$\Phi_e^\gamma(\mathbf{c}) \equiv 0 \text{ or } \frac{1}{2}, \quad \text{(A-25)}$$

which implies that γ is an operation of order 2.

Proof: Application of Eq. (3) to the horizontal generating vectors yields no further constraints beyond the general result R0. Application of Eq. (3) to the vertical stacking vector yields Eq. (A-21), and application of Eq. (3) to the staggered stacking vector yields

$$\Phi_e^\gamma(\mathbf{z}+\mathbf{h}) \equiv -\Phi_e^\gamma(\mathbf{z}+\mathbf{h}) + \Phi_e^\gamma(2\mathbf{h}). \quad \text{(A-26)}$$

Because $\Phi_e^\gamma(2\mathbf{h}) \equiv 0$, Eqs. (A-21) and (A-26) imply that for both lattice types the phase on the stacking vector is either 0 or 1/2.

H2. If $\gamma \in \Gamma_e$, is an operation of order $n > 2$, and $\eta\gamma\eta^{-1} = \gamma^{-1}$ there are no additional constraints on the phase function Φ_e^γ.

Proof: This can easily be seen by applying Eq. (3) to the generating vectors while noting that $\Phi_e^\gamma(2\mathbf{h}) \equiv 0$.

H3. If $2_x^*, 2_y^* \in \Gamma_e$, where the asterisk denotes an optional prime, then they must both commute with η and their phase functions are only constrained by results R0 and H1.

Proof: Let us denote the two operations by γ_1 and γ_2 and assume that rather than commuting with η they satisfy $\eta\gamma_1\eta^{-1} = \gamma_2$, then application of Eq. (3) to the generating vectors of both lattice types, while noting that $\Phi_e^\gamma(2\mathbf{h}) \equiv 0$, establishes that both phase functions are identical everywhere in contradiction with the fact that $\gamma_1 \neq \gamma_2$.

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Appendix B. Octagonal spin space-group types: Values of the phase functions [Not to be included in the printed version of the paper]

We give here the remaining calculation of the phase functions for point groups that were not treated in Section 6. of the main part of the paper as well as the Tables of all explcicit results.

B.1. Point group $G = 8$ (generator r_8)

The phase functions for point group $G = 8$ were calculated in Section 6.1. and are summarized here in Table B-1 for V-lattices, and Table B-2 for S-lattices.

B.2. Point group $G = \bar{8}$ (generator $\bar{r}_8$)

The only phase function to be determined, $\Phi^{\delta}_{\bar{r}_8}$, is zero everywhere on both lattice types due to the choice of gauge in sections 5.1. and 5.2.. Note that in this case

$$\Phi_e^{\delta^8}(\mathbf{k})\equiv\Phi^{\delta^8}_{\bar{r}_8^8}(\mathbf{k})\equiv\Phi^{\delta}_{\bar{r}_8}(\mathbf{k}+\bar{r}_8\mathbf{k}+\ldots\bar{r}_8^7\mathbf{k})\equiv0, \qquad \text{(B-1)}$$

and therefore $\delta^8 = \epsilon$ whenever $\bar{r}_8$ is a generator of G.

The phase functions for point group $G = \bar{8}$ are summarized in Table B-3 for V-lattices, and Table B-4 for S-lattices.

B.3. Point group $G = 8mm$ (generators r_8 and m)

The phase functions for point group $G = 8mm$ were calculated in Section 6.2. and are summarized here again for convenience in Table B-5 for V-lattices, and Table B-6 for S-lattices.

B.4. Point group $G = \bar{8}m2$ (generators $\bar{r}_8$ and m)

Here we only need to determine the phase function $\Phi^{\mu}_m(\mathbf{k})$ because by the initial choice of gauge $\Phi^{\delta}_{\bar{r}_8}(\mathbf{k})\equiv0$. We use the generating relations $m^2 = e$ and $\bar{r}_8 m\bar{r}_8 = m$, which through group compatibility conditions of the form (46) and (49) yield equations that resemble those for $G = 8mm$ with $\bar{r}_8$ replacing r_8.

For the horizontal generating vectors we again find that Φ^{μ}_m has two possible solutions given by Eq. (60). For the vertical stacking vector, for which $\bar{r}_8\mathbf{z} = -\mathbf{z}$ and $m\mathbf{z} = \mathbf{z}$, Eqs. (46) and (49) become

$$\Phi_e^{\mu^{-1}\delta\mu\delta}(\mathbf{z})\equiv-2\Phi^{\mu}_m(\mathbf{z}), \qquad \text{(B-2a)}$$

$$\Phi_e^{\mu^2}(\mathbf{z})\equiv2\Phi^{\mu}_m(\mathbf{z}). \qquad \text{(B-2b)}$$

The solutions to these equations are

$$\Phi^{\mu}_m(\mathbf{z})\equiv\frac{1}{2}\Phi_e^{\mu^2}(\mathbf{z})+a, \quad a\equiv0 \text{ or } \frac{1}{2}, \qquad \text{(B-3a)}$$

with the additional condition that

$$\Phi_e^{\mu^2}(\mathbf{z})+\Phi_e^{\mu^{-1}\delta\mu\delta}(\mathbf{z})\equiv0. \qquad \text{(B-3b)}$$

For the staggered stacking vector, for which $\bar{r}_8(\mathbf{z}+\mathbf{h}) = -(\mathbf{z}+\mathbf{h})-\mathbf{b}^{(4)}$ and $m(\mathbf{z}+\mathbf{h}) = (\mathbf{z}+\mathbf{h})-\mathbf{b}^{(3)}$, Eqs. (46) and (49) become

$$\Phi_e^{\mu^{-1}\delta\mu\delta}(\mathbf{z}+\mathbf{h})\equiv-2\Phi^{\mu}_m(\mathbf{z}+\mathbf{h})-\Phi^{\mu}_m(\mathbf{b}^{(4)}) \qquad \text{(B-4a)}$$

$$\Phi_e^{\mu^2}(\mathbf{z}+\mathbf{h})\equiv2\Phi^{\mu}_m(\mathbf{z}+\mathbf{h})-\Phi^{\mu}_m(\mathbf{b}^{(3)}) \qquad \text{(B-4b)}$$

The solutions to these equations are

$$\Phi^{\mu}_m(\mathbf{z}+\mathbf{h})\equiv\frac{1}{2}\Phi^{\mu}_m(\mathbf{b}^{(3)})+\frac{1}{2}\Phi_e^{\mu^2}(\mathbf{z}+\mathbf{h})+a, \quad a\equiv0 \text{ or } \frac{1}{2}, \qquad \text{(B-5a)}$$

with the additional condition that

$$\Phi_e^{\mu^2}(\mathbf{z}+\mathbf{h})+\Phi_e^{\mu^{-1}\delta\mu\delta}(\mathbf{z}+\mathbf{h})\equiv\Phi^{\mu}_m(\mathbf{b}^{(3)})+\Phi^{\mu}_m(\mathbf{b}^{(4)}). \qquad \text{(B-5b)}$$

A gauge transformation (45) with $\chi_3(\mathbf{b}^{(i)})\equiv1/2$ changes the phase $\Phi^{\mu}_m(\mathbf{z}+\mathbf{h})$ by 1/2 and therefore the two solutions in Eq. (B-5a) are gauge-equivalent. We take the one with $a\equiv0$.

The phase functions for point group $G = \bar{8}m2$ are summarized in Table B-7 for V-lattices, and Table B-8 for S-lattices.

B.5. Point group $G = 822$ (generators r_8 and d)

We need to determine the phase $\Phi^{\delta}_{r_8}(\mathbf{c})$ and the phases $\Phi^{\alpha}_d(\mathbf{b}^{(i)})$—since $\Phi^{\delta}_{r_8}(\mathbf{b}^{(i)})\equiv\Phi^{\alpha}_d(\mathbf{c})\equiv0$ by our choice of gauge—using the generating relations $r_8^8 = d^2 = e$ and $r_8dr_8 = d$. The relation $r_8^8 = e$ yields the same equation for $\Phi^{\delta}_{r_8}(\mathbf{c})$ as in the case of point group $G = 8$, giving rise to the same solutions as those given by Eqs. (52) and (56).

The determination of $\Phi^{\alpha}_d(\mathbf{b}^{(i)})$ is similar to that of $\Phi^{\mu}_m(\mathbf{b}^{(i)})$ in the case of point group $G = 8mm$. If d is the dihedral rotation that leaves $\mathbf{b}^{(1)}$ invariant, then application of Eq. (46) to $\mathbf{b}^{(3)}$ which is perpendicular to $\mathbf{b}^{(1)}$ yields

$$\Phi_e^{\alpha^2}(\mathbf{b}^{(3)})\equiv\Phi^{\alpha}_d(d\mathbf{b}^{(3)}+\mathbf{b}^{(3)})\equiv0, \qquad \text{(B-6)}$$

implying that $\Phi_e^{\alpha^2}(\mathbf{b}^{(i)})\equiv0000$. Application of Eq. (46) to $\mathbf{b}^{(1)}$ then yields

$$0\equiv2\Phi^{\alpha}_d(\mathbf{b}^{(1)}) \Longrightarrow \Phi^{\alpha}_d(\mathbf{b}^{(1)})\equiv0 \text{ or } \frac{1}{2}, \qquad \text{(B-7)}$$

and application of Eq. (46) to $\mathbf{b}^{(2)}$ and $\mathbf{b}^{(4)}$ shows that $\Phi^{\alpha}_d(\mathbf{b}^{(2)})\equiv\Phi^{\alpha}_d(\mathbf{b}^{(4)})$, but provides no further information regarding the actual values of these phases. Next, we apply Eq. (49) to the horizontal generating vectors to obtain

$$\Phi^{\alpha}_d(\mathbf{b}^{(i+1)})\equiv\Phi^{\alpha}_d(\mathbf{b}^{(i)})+\Phi_e^{\alpha^{-1}\delta\alpha\delta}(\mathbf{b}^{(i)}). \qquad \text{(B-8)}$$

Thus, $\Phi^{\alpha}_d(\mathbf{b}^{(1)})$ determines the values of Φ^{α}_d on the remaining horizontal generating vectors through the phase function $\Phi_e^{\alpha^{-1}\delta\alpha\delta}$:

$$\Phi^{\alpha}_d(\mathbf{b}^{(i)})\equiv\begin{cases}0000 \text{ or } \frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2} & \text{if } \Phi_e^{\alpha^{-1}\delta\alpha\delta}(\mathbf{b}^{(i)})\equiv0000,\\ 0\frac{1}{2}0\frac{1}{2} \text{ or } \frac{1}{2}0\frac{1}{2}0 & \text{if } \Phi_e^{\alpha^{-1}\delta\alpha\delta}(\mathbf{b}^{(i)})\equiv\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}.\end{cases} \qquad \text{(B-9)}$$

For the vertical stacking vector, for which $d\mathbf{z} = -\mathbf{z}$, we obtain

$$\Phi_e^{\alpha^{-1}\delta\alpha\delta}(\mathbf{z})\equiv0, \qquad \text{(B-10a)}$$

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$$\Phi_e^{\alpha^2}(\mathbf{z}) \equiv 0. \qquad \text{(B-10b)}$$

The latter of the two, together with Eq. (B-6), implies that on V-lattices $\alpha^2 = \epsilon$.

For the staggered stacking vector, for which $d(\mathbf{z}+\mathbf{h}) = -(\mathbf{z}+\mathbf{h}) + 2\mathbf{h} - \mathbf{b}^{(3)}$, we obtain the additional constraints

$$\Phi_d^{\alpha}(\mathbf{b}^{(4)}) \equiv \Phi_e^{\alpha^{-1}\delta\alpha\delta}(\mathbf{z}+\mathbf{h}), \qquad \text{(B-11a)}$$

$$\Phi_d^{\alpha}(\mathbf{b}^{(3)}) \equiv \Phi_e^{\alpha^2}(\mathbf{z}+\mathbf{h}). \qquad \text{(B-11b)}$$

From Eq. (B-11a) we find that $\Phi_e^{\alpha^{-1}\delta\alpha\delta}(\mathbf{z}+\mathbf{h})$ must be either 0 or 1/2 and therefore that $\alpha^{-1}\delta\alpha\delta$ is either ϵ or $2_{\bar{z}}$. In either case $\Phi_e^{\alpha^{-1}\delta\alpha\delta}(\mathbf{b}^{(i)}) \equiv 0$ so only the first of the two cases given in Eq. (B-9) is possible. This then implies that the left-hand sides of Eqs. (B-11) are equal and therefore that $\alpha^{-1}\delta\alpha\delta = \alpha^2$. The values of Φ_d^{α} on the horizontal generating vectors for S-lattices are thus given by

$$\Phi_d^{\alpha}(\mathbf{b}^{(i)}) \equiv \begin{cases} 0000 & \text{if } \alpha^{-1}\delta\alpha\delta = \alpha^2 = \epsilon, \\ \frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2} & \text{if } \alpha^{-1}\delta\alpha\delta = \alpha^2 = 2_{\bar{z}}. \end{cases} \qquad \text{(B-12)}$$

The phase functions for point group $G = 822$ are summarized in Table B-9 for V-lattices, and Table B-10 for S-lattices.

B.6. Point group $G = \bar{8}2m$ (generators $\bar{r}_8$ and d)

We need to determine the phase function $\Phi_d^{\alpha}(\mathbf{k})$ because we have chosen a gauge in which $\Phi_{\bar{r}_8}^{\delta}(\mathbf{k}) \equiv 0$. We use the generating relations $d^2 = e$ and $\bar{r}_8 d \bar{r}_8 = d$, which through group compatibility conditions of the form (46) and (49) yield equations that resemble those for $G = 822$ with $\bar{r}_8$ replacing r_8.

For the horizontal generating vectors we again find that Φ_d^{α} has two possible solutions given by Eq. (B-9), and that $\Phi_e^{\alpha^2}(\mathbf{b}^{(i)}) \equiv 0000$. For the vertical stacking vector, for which $\bar{r}_8\mathbf{z} = d\mathbf{z} = -\mathbf{z}$, Eqs. (46) and (49) become

$$\Phi_e^{\alpha^{-1}\delta\alpha\delta}(\mathbf{z}) \equiv -2\Phi_d^{\alpha}(\mathbf{z}), \qquad \text{(B-13a)}$$

$$\Phi_e^{\alpha^2}(\mathbf{z}) \equiv 0. \qquad \text{(B-13b)}$$

The solutions to Eq. (B-13a) are

$$\Phi_d^{\alpha}(\mathbf{z}) \equiv -\frac{1}{2}\Phi_e^{\alpha^{-1}\delta\alpha\delta}(\mathbf{z}) + a, \quad a \equiv 0 \text{ or } \frac{1}{2}, \qquad \text{(B-14)}$$

and Eq. (B-13b) implies that on V-lattices $\alpha^2 = \epsilon$.

For the staggered stacking vector, for which $\bar{r}_8(\mathbf{z}+\mathbf{h}) = -(\mathbf{z}+\mathbf{h}) - \mathbf{b}^{(4)}$ and $d(\mathbf{z}+\mathbf{h}) = -(\mathbf{z}+\mathbf{h}) + 2\mathbf{h} - \mathbf{b}^{(3)}$, Eqs. (46) and (49) become

$$\Phi_e^{\alpha^{-1}\delta\alpha\delta}(\mathbf{z}+\mathbf{h}) \equiv -2\Phi_d^{\alpha}(\mathbf{z}+\mathbf{h}) - \Phi_d^{\alpha}(\mathbf{b}^{(4)}), \qquad \text{(B-15a)}$$

$$\Phi_e^{\alpha^2}(\mathbf{z}+\mathbf{h}) \equiv -\Phi_d^{\alpha}(\mathbf{b}^{(3)}). \qquad \text{(B-15b)}$$

The solutions to Eq. (B-15a) are

$$\Phi_d^{\alpha}(\mathbf{z}+\mathbf{h}) \equiv \frac{1}{2}\Phi_d^{\alpha}(\mathbf{b}^{(4)}) - \frac{1}{2}\Phi_e^{\alpha^{-1}\delta\alpha\delta}(\mathbf{z}+\mathbf{h}) + a, \quad a \equiv 0 \text{ or } \frac{1}{2}, \qquad \text{(B-16)}$$

with the additional condition, given by Eq. (B-15b), that $\Phi_d^{\alpha}(\mathbf{b}^{(3)})$ is determind by α^2, reducing the possible solutions in (B-9) to one. Note that none of the gauge transformations χ_3 in Eq. (45) can change the phase $\Phi_d^{\alpha}(\mathbf{z}+\mathbf{h})$.

The phase functions for point group $G = \bar{8}2m$ are summarized in Table B-11 for V-lattices, and Table B-12 for S-lattices.

B.7. Point group $G = 8/m$ (generators r_8 and h)

We are using a gauge in which $\Phi_{r_8}^{\delta}(\mathbf{b}^{(i)}) \equiv \Phi_h^{\eta}(\mathbf{c}) \equiv 0$, and therefore need to determine the phases $\Phi_h^{\eta}(\mathbf{b}^{(i)})$ and $\Phi_{r_8}^{\delta}(\mathbf{c})$ using the generating relations $r_8^8 = h^2 = e$ and $hr_8h = r_8$. Equations (49) and (46) for the horizontal generating vectors are

$$\Phi_h^{\eta}(\mathbf{b}^{(i)} + \mathbf{b}^{(i+1)}) \equiv \Phi_e^{\delta^{-1}\eta\delta\eta}(\mathbf{b}^{(i)}), \qquad \text{(B-17a)}$$

$$2\Phi_h^{\eta}(\mathbf{b}^{(i)}) \equiv \Phi_e^{\eta^2}(\mathbf{b}^{(i)}). \qquad \text{(B-17b)}$$

Due to the fact that $\Phi_e^{\delta^{-1}\eta\delta\eta}(\mathbf{b}^{(i)}) \equiv 0000$ or $\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}$, application of Eq. (B-17a) to successive horizontal generating vectors establishes that $\Phi_h^{\eta}(-\mathbf{b}^{(i)}) \equiv \Phi_h^{\eta}(\mathbf{b}^{(i)})$, and therefore that the in-plane phases are given by

$$\Phi_h^{\eta}(\mathbf{b}^{(i)}) \equiv \begin{cases} 0000 \text{ or } \frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2} & \text{if } \Phi_e^{\delta^{-1}\eta\delta\eta}(\mathbf{b}^{(i)}) \equiv 0000, \\ 0\frac{1}{2}0\frac{1}{2} \text{ or } \frac{1}{2}0\frac{1}{2}0 & \text{if } \Phi_e^{\delta^{-1}\eta\delta\eta}(\mathbf{b}^{(i)}) \equiv \frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}. \end{cases} \qquad \text{(B-18)}$$

Eq. (B-17b) then implies that $\Phi_e^{\eta^2}(\mathbf{b}^{(i)}) \equiv 0000$. For the vertical stacking vector, for which $h\mathbf{z} = -\mathbf{z}$, the equations are

$$-2\Phi_{r_8}^{\delta}(\mathbf{z}) \equiv \Phi_e^{\delta^{-1}\eta\delta\eta}(\mathbf{z}) \qquad \text{(B-19a)}$$

$$\Phi_e^{\eta^2}(\mathbf{z}) \equiv 0 \qquad \text{(B-19b)}$$

The solutions to Eq. (B-19a) are

$$\Phi_{r_8}^{\delta}(\mathbf{z}) \equiv -\frac{1}{2}\Phi_e^{\delta^{-1}\eta\delta\eta}(\mathbf{z}) + c, \quad c \equiv 0 \text{ or } \frac{1}{2}, \qquad \text{(B-20)}$$

and Eq. (B-19b) implies that on V-lattices $\eta^2 = \epsilon$.

For the staggered stacking vector, for which $h(\mathbf{z}+\mathbf{h}) = -(\mathbf{z}+\mathbf{h}) + 2\mathbf{h}$, and using the fact that $\Phi_{r_8}^{\delta}(2\mathbf{h}) \equiv \Phi_h^{\eta}(2r_8\mathbf{h}) \equiv 0$, the equations are

$$-\Phi_h^{\eta}(\mathbf{b}^{(4)}) - 2\Phi_{r_8}^{\delta}(\mathbf{z}+\mathbf{h}) \equiv \Phi_e^{\delta^{-1}\eta\delta\eta}(\mathbf{z}+\mathbf{h}) \qquad \text{(B-21a)}$$

$$\Phi_e^{\eta^2}(\mathbf{z}+\mathbf{h}) \equiv 0. \qquad \text{(B-21b)}$$

The solutions to Eq. (B-21a) are

$$\Phi_{r_8}^{\delta}(\mathbf{z}+\mathbf{h}) \equiv \frac{1}{2}\Phi_h^{\eta}(\mathbf{b}^{(4)}) - \frac{1}{2}\Phi_e^{\delta^{-1}\eta\delta\eta}(\mathbf{z}+\mathbf{h}) + c, \quad c \equiv 0 \text{ or } \frac{1}{2}, \qquad \text{(B-22)}$$

but a gauge transformation (45) with $\chi_3(\mathbf{b}^{(i)}) \equiv 1/2$ shows that the two solutions are gauge-equivalent, allowing us to take $c \equiv 0$. Eq. (B-21b) implies that $\eta^2 = \epsilon$ on S-lattices, as well. Finally, the generating relation $r_8^8 = e$ imposes Eq. (50) as in the case of point group $G = 8$, for both lattice types. Together with Eqs. (B-19a) and (B-21a) this implies that

$$\Phi_e^{\delta^8}(\mathbf{c}) \equiv -4\Phi_e^{\delta^{-1}\eta\delta\eta}(\mathbf{c}), \qquad \text{(B-23)}$$

which is true for the horizontal generating vectors as well, and therefore $\delta^8 = (\delta^{-1}\eta\delta\eta)^{-4}$.

The phase functions for point group $G = 8/m$ are summarized in Table B-13 for V-lattices, and Table B-14 for S-lattices.

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B.8. Point group $G = 8/mmm$ (generators r_8, m, and h)

We need to determine the phase $\Phi_{r_8}^{\delta}(\mathbf{c})$, the phases $\Phi_h^{\eta}(\mathbf{b}^{(i)})$, and the complete phase function $\Phi_m^{\mu}(\mathbf{k})$. The generating relations and the equations they impose are the same as those for $G = 8mm$ and those for $G = 8/m$, with the additional condition imposed by the generating relation $mhm = h$ which yields

$$\Phi_e^{\eta^{-1}\mu\eta\mu}(\mathbf{b}^{(i)}) \equiv 2\Phi_m^{\mu}(\mathbf{b}^{(i)}) \equiv 0, \tag{B-24a}$$

$$\Phi_e^{\eta^{-1}\mu\eta\mu}(\mathbf{z}) \equiv 0, \tag{B-24b}$$

$$\Phi_e^{\eta^{-1}\mu\eta\mu}(\mathbf{z}+\mathbf{h}) \equiv \Phi_m^{\mu}(\mathbf{b}^{(1)}) - \Phi_h^{\eta}(\mathbf{b}^{(3)}), \tag{B-24c}$$

for the horizontal generating vectors, vertical stacking vector, and staggered stacking vector, respectively.

For V-lattices Eqs. (B-24a) and (B-24b) imply that $\eta^{-1}\mu\eta\mu = \epsilon$ but do not impose any additional constraints on the phase functions already determined for point groups $G = 8mm$ and $G = 8/m$. Thus the solutions for point group $G = 8/mmm$ are simply the combination of the two, so $\Phi_h^{\eta}(\mathbf{b}^{(i)})$ is given by Eq. (B-18), $\Phi_m^{\mu}(\mathbf{b}^{(i)})$ by Eq. (60), and $\Phi_{r_8}^{\delta}(\mathbf{z})$ and $\Phi_m^{\mu}(\mathbf{z})$ by Eqs. (62), with the additional conditions that

$$\Phi_e^{\mu^{-1}\delta\mu\delta}(\mathbf{z}) + \Phi_e^{\delta^{-1}\eta\delta\eta}(\mathbf{z}) \equiv 0, \tag{B-25}$$

$\Phi_e^{\mu^2}(\mathbf{b}^{(i)}) \equiv 0000$, $\eta^2 = \eta^{-1}\mu\eta\mu = \epsilon$, and $\delta^8 = (\mu^{-1}\delta\mu\delta)^4 = (\delta^{-1}\eta\delta\eta)^{-4}$.

For S-lattices Eq. (B-24c) implies that $\Phi_e^{\eta^{-1}\mu\eta\mu}(\mathbf{z}+\mathbf{h})$ can be either 0 or 1/2 and therefore that $\eta^{-1}\mu\eta\mu$ is either ϵ or $2_{\bar{z}}$. It also imposes a constraint between the two phase functions Φ_m^{μ} and Φ_h^{η}. Therefore, on S-lattices $\Phi_h^{\eta}(\mathbf{b}^{(i)})$ is again given by Eq. (B-18), but

$$\Phi_m^{\mu}(\mathbf{b}^{(i)}) \equiv \Phi_h^{\eta}(\mathbf{b}^{(i)}) + \Phi_e^{\eta^{-1}\mu\eta\mu}(\mathbf{z}+\mathbf{h}), \tag{B-26}$$

and $\Phi_{r_8}^{\delta}(\mathbf{z}+\mathbf{h})$ and $\Phi_m^{\mu}(\mathbf{z}+\mathbf{h})$ are given by Eqs. (64), with the additional conditions that

$$\Phi_e^{\mu^{-1}\delta\mu\delta}(\mathbf{b}^{(i)}) \equiv \Phi_e^{\delta^{-1}\eta\delta\eta}(\mathbf{b}^{(i)}), \tag{B-27a}$$

$$\Phi_e^{\mu^{-1}\delta\mu\delta}(\mathbf{z}+\mathbf{h}) + \Phi_e^{\delta^{-1}\eta\delta\eta}(\mathbf{z}+\mathbf{h}) \equiv \Phi_e^{\eta^{-1}\mu\eta\mu}(\mathbf{z}+\mathbf{h}), \tag{B-27b}$$

$\Phi_e^{\mu^2}(\mathbf{b}^{(i)}) \equiv \Phi_e^{\eta^{-1}\mu\eta\mu}(\mathbf{b}^{(i)}) \equiv 0000$, $\Phi_e^{\eta^{-1}\mu\eta\mu}(\mathbf{z}+\mathbf{h}) \equiv 0$ or 1/2 depending on whether $\eta^{-1}\mu\eta\mu$ is ϵ or $2_{\bar{z}}$, $\eta^2 = \epsilon$, and $\delta^8 = (\mu^{-1}\delta\mu\delta)^4 = (\delta^{-1}\eta\delta\eta)^{-4}$.

The phase functions for point group $G = 8/mmm$ are summarized in Table B-15 for V-lattices, and Table B-16 for S-lattices.

Table B-1

Spin space-group types on V-lattices with $G = 8$. In this, and in the following tables a, b, a', and b' are independently 0 or $\frac{1}{2}$, as long as there are no two operations in Γ_e with identical phase functions, and c is any integer between 0 and 7. For $\Gamma_e = n$, n', or $n1'$ the integer j is co-prime with N, where $N = n$ unless $\Gamma_e = n'$ and n is odd, in which case $N = 2n$. If N is odd a is necessarily 0. The integer $d = 1$ unless N is twice an odd number and $\Phi_e^{n_{\bar{z}}^*}(\mathbf{b}^{(i)}) \equiv \frac{1}{2}$, in which case $d = 1$ or 2. A_0 denotes the values $0\frac{1}{2}0\frac{1}{2}$ of a phase function on the horizontal generating vectors, and A_1 denotes the values $\frac{1}{2}0\frac{1}{2}0$ on the same generators. Lines 3a and 3b refer to distinct spin space-group types if $\Gamma_e = 2'2'2$, but give scale-equivalent solutions if $\Gamma_e = 222$, or $2'2'2'$, where 3a is taken as the representative solution. The spin space group symbols for all groups in this table are of the form $P_{\dots}^{\Gamma_e}8_c^{\delta}$. For example, if $\Gamma_e = 222$, $G_\epsilon = 4$ and $\Gamma = 2'2'2'$, then δ can be chosen to be ϵ', the corresponding line in the Table is 3a or 3b, but since for $\Gamma_e = 222$ they are scale-equivalent only 3a is taken. If, in addition, $\Phi_{r_8}^{\delta}(\mathbf{z}) \equiv \frac{5}{8}$ the spin space group symbol is $P_{2c,P,S}^{222}8_5'$.

$\Gamma_e = 1, 1', 2, 2', 21'$					
	δ^8	$\Phi_e^{2_{\bar{z}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{\epsilon'}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_{r_8}^{\delta}(\mathbf{z})$	
1	ϵ	ab	$a'b'$	$\frac{c}{8}$	
2	$2_{\bar{z}}$	$0\frac{1}{2}$	$--$	$\frac{c}{8}+\frac{1}{16}$	
$\Gamma_e = 222, 2'2'2, 2'2'2'$					$(\delta \in 4221' \Rightarrow \delta^8 = \epsilon)$
	$\delta 2_{\bar{x}}\delta^{-1}$	$\Phi_e^{2_{\bar{x}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{2_{\bar{y}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{2_{\bar{z}}'}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_{r_8}^{\delta}(\mathbf{z})$
3a	$2_{\bar{x}}$	$0\frac{1}{2}$	$\frac{1}{2}0$	$--$	$\frac{c}{8}$
3b		ab	$\frac{1}{2}\frac{1}{2}$	$--$	$\frac{c}{8}$
4	$2_{\bar{y}}$	$A_0 b$	$A_1 b$	$a\frac{1}{2}$	$\frac{c}{8}$
$\Gamma_e = n, n', n1'$					$(\delta n_{\bar{z}}\delta^{-1} = n_{\bar{z}})$
	δ^8	$\Phi_e^{n_{\bar{z}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{\epsilon'}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_{r_8}^{\delta}(\mathbf{z})$	
5	ϵ	$a\frac{dj}{N}$	$a'b'$	$\frac{c}{8}$	
6	$n_{\bar{z}}$	$a\frac{dj}{n}$	$a'b'$	$\frac{c}{8}+\frac{dj}{8n}$	
7	$n_{\bar{z}}^2$	$a\frac{dj}{N}$	$a'b'$	$\frac{c}{8}+\frac{dj}{4N}$	
8	$n_{\bar{z}}^3$	$a\frac{dj}{n}$	$a'b'$	$\frac{c}{8}+\frac{3dj}{8n}$	
9	$n_{\bar{z}}^4$	$a\frac{dj}{N}$	$a'b'$	$\frac{c}{8}+\frac{dj}{2N}$	

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Table B-2

Spin space-group types on S-lattices with $G = 8$. In this and in the following tables c' is any integer between 0 and 3. For $\Gamma_e = n$, or n', the integer j is co-prime with N, where $N = n$ unless $\Gamma_e = n'$ and n is odd, in which case $N = 2n$. The spin space-group symbols for all groups in this table are of the form $S^{\Gamma_e}_{\ldots}8^{\delta}_{c'}$. For example, if $\Gamma_e = n$, $G_\epsilon = 4$ and $\Gamma = n22$ then δ can be chosen to be $2_{\bar{x}}$ and the corresponding line in the Table is 9 (and n is necessarily 4). If, in addition, $j = 3$ and $\Phi^{\delta}_{r_8}(\mathbf{z}+\mathbf{h}) \equiv \frac{1}{4}$ the spin space-group symbol is $S^4_{4_3S}8^{2_{\bar{x}}}_2$.

$\Gamma_e = 1, 1', 2, 2'$				
	δ^8	$\Phi^{\gamma}_e(\mathbf{k})$	$\Phi^{\delta}_{r_8}(\mathbf{z}+\mathbf{h})$	
1	ϵ	$0\frac{1}{2}$	$\frac{c'}{8}$	
2	$2_{\bar{z}}$	$0\frac{1}{2}$	$\frac{c'}{8} + \frac{1}{16}$	
$\Gamma_e = 222, 2'2'2$		$(\delta \in 4221' \Rightarrow \delta^8 = \epsilon, \delta 2_{\bar{x}}\delta^{-1} = 2_{\bar{y}})$		
	$\Phi^{2^*_{\bar{x}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{2^*_{\bar{y}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{\delta}_{r_8}(\mathbf{z}+\mathbf{h})$	
3	$\frac{1}{2}0$	$\frac{1}{2}\frac{1}{2}$	$\frac{c'}{8}$	
$\Gamma_e = n, n', n1'$				
	$\delta n_{\bar{z}}\delta^{-1}$	δ^8	$\Phi^{n^*_{\bar{z}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{\delta}_{r_8}(\mathbf{z}+\mathbf{h})$
4	$n_{\bar{z}}$	ϵ	$0\frac{j}{N}$	$\frac{c'}{8}$
5	$n_{\bar{z}}$	$n_{\bar{z}}$	$0\frac{j}{n}$	$\frac{c'}{8} + \frac{j}{8n}$
6	$n_{\bar{z}}$	$n^2_{\bar{z}}$	$0\frac{j}{N}$	$\frac{c'}{8} + \frac{j}{4N}$
7	$n_{\bar{z}}$	$n^3_{\bar{z}}$	$0\frac{j}{n}$	$\frac{c'}{8} + \frac{3j}{8n}$
8	$n_{\bar{z}}$	$n^4_{\bar{z}}$	$0\frac{j}{N}$	$\frac{c'}{8} + \frac{j}{2N}$
9	$n^{-1}_{\bar{z}}$	ϵ	$\frac{1}{2}\frac{j}{n}(n=4)$	$\frac{c'}{8}$

Table B-3

Spin space-group types on V-lattices with $G = \bar{8}$. The possible values of a, b, a', b', N, j, and d, as well as the notations A_0 and A_1 are as explained in the caption of Table B-1. Recall that since $\bar{r}_8$ is a generator of G, δ^8 is necessarily ϵ. Lines 2a and 2b refer to distinct spin space-group types if $\Gamma_e = 2'2'2$ but are scale-equivalent if $\Gamma_e = 222$, or $2'2'2'$, for which line 2a suffices. Spin space-group symbols for all groups in this table are of the form $P^{\Gamma_e}_{\ldots}\bar{8}^{\delta}$.

$\Gamma_e = 1, 1', 2, 2', 21'$				
	$\Phi^{2^*_{\bar{z}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{\epsilon'}_e(\mathbf{b}^{(i)}\mathbf{c})$		
1	ab	$a'b'$		
$\Gamma_e = 222, 2'2'2, 2'2'2'$				
	$\delta 2_{\bar{x}}\delta^{-1}$	$\Phi^{2^*_{\bar{x}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{2^*_{\bar{y}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{2'_{\bar{z}}}_e(\mathbf{b}^{(i)}\mathbf{c})$
2a	$2_{\bar{x}}$	$0\frac{1}{2}$	$\frac{1}{2}0$	$--$
2b	$2_{\bar{x}}$	ab	$\frac{1}{2}\frac{1}{2}$	$--$
3	$2_{\bar{y}}$	A_0b	A_1b	$a\frac{1}{2}$
$\Gamma_e = n, n', n1'$				$(\delta n_{\bar{z}}\delta^{-1} = n^{-1}_{\bar{z}})$
	δ^8	$\Phi^{n^*_{\bar{z}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{\epsilon'}_e(\mathbf{b}^{(i)}\mathbf{c})$	
4	ϵ	$a\frac{dj}{N}$	$a'b'$	

Table B-4

Spin space group-types on S-lattices with $G = \bar{8}$. The possible values of N and j are as explained in the caption of Table B-2. Recall that since $\bar{r}_8$ is a generator of G, δ^8 is necessarily ϵ. Spin space-group symbols for all groups in this table are of the form $S^{\Gamma_e}_{\ldots}\bar{8}^{\delta}$.

$\Gamma_e = 1, 1', 2, 2', 21'$			
	$\Phi_e^{\gamma}(\mathbf{b}^{(i)}\mathbf{c})$		
1	$0\frac{1}{2}$		
$\Gamma_e = 222, 2'2'2$			
	$\delta 2_{\bar{x}}\delta^{-1}$	$\Phi_e^{2_{\bar{x}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{2_{\bar{y}}^*}(\mathbf{b}^{(i)}\mathbf{c})$
2	$2_{\bar{y}}$	$\frac{1}{2}0$	$\frac{1}{2}\frac{1}{2}$
$\Gamma_e = n, n'$			
	$\delta n_{\bar{z}}\delta^{-1}$	$\Phi_e^{n_{\bar{z}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	
3	$n_{\bar{z}}^{-1}$	$0\frac{j}{N}$	
4	$n_{\bar{z}}$	$\frac{1}{2}\frac{j}{n}(n = 4)$	

Table B-5

Spin space-group types on V-lattices with $G = 8mm$. The possible values of a, b, a', b', N, j, and d, as well as the notations A_0 and A_1 are as explained in the caption of Table B-1. Lines 5a and 5b refer to distinct spin space-group types if $\Gamma_e = 2'2'2$ but are scale-equivalent if $\Gamma_e = 222$, or $2'2'2'$, for which line 3a suffices. $\hat{a}$, $\hat{b}$ and $\tilde{a}$ denote either 0 or $\frac{1}{2}$. Spin space-group symbols are of the form $P^{\Gamma_e}_{\ldots}8^{\delta}m^{\mu}m^{\delta\mu}$ where the primary 8^{δ} is replaced by 8_4^{δ} if $\tilde{a} = \frac{1}{2}$ and the secondary m^{μ} is replaced according to the values of $\hat{a}$ and $\hat{b}$: $\hat{a} = \hat{b} = 0 \Rightarrow m^{\mu} \to m^{\mu}$, $\hat{a} = 0, \hat{b} = \frac{1}{2} \Rightarrow m^{\mu} \to c^{\mu}$, $\hat{a} = \frac{1}{2}, \hat{b} = 0 \Rightarrow m^{\mu} \to b^{\mu}$, $\hat{a} = \hat{b} = \frac{1}{2} \Rightarrow m^{\mu} \to n^{\mu}$. The tertiary $m^{\delta\mu}$ is replaced by $c^{\delta\mu}$ if either $\hat{b}$ or $\tilde{a}$ (but not both) is $\frac{1}{2}$. Furtheremore, a subscript a is added to the secondary m^{μ} when $\Phi_m^{\mu}(\mathbf{b}^{(i)}) \equiv A_0 + \hat{a}$. For example, if $\Gamma_e = 2'2'2$, $G_{\epsilon} = 4mm$, $\Gamma = 2'2'2'$, then δ can be chosen to be ϵ' and the spin space group is described by line 5a or 5b, if $ab = \frac{1}{2}0$, $\hat{a} = \frac{1}{2}$, $\hat{b} = 0$ and $\tilde{a} = 0$ the spin space group symbol will be $P^{2'2'2}_{P,S,2c}8'nc'$.

$\Gamma_e = 1, 1', 2, 2', 21'$								$(\delta^8 = \epsilon)$
	$\mu^{-1}\delta\mu\delta$	μ^2	$\Phi_e^{2_{\bar{z}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{\epsilon'}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_m^{\mu}(\mathbf{b}^{(i)})$	$\Phi_m^{\mu}(\mathbf{z})$	$\Phi_{r_8}^{\delta}(\mathbf{z})$	
1	ϵ	ϵ	ab	$a'b'$	$\hat{a}$	$\hat{b}$	$\tilde{a}$	
2	ϵ	$2_{\bar{z}}$	$0\frac{1}{2}$	$\frac{1}{2}a$	$\hat{a}$	$\hat{b}$	$\tilde{a}$	
3	$2_{\bar{z}}$	ϵ	$0\frac{1}{2}$	$\frac{1}{2}a$	$\hat{a}$	$\hat{b}$	$\tilde{a}$	
			$\frac{1}{2}a$	$a'b'$	$\hat{a} + A_0$	$\hat{b}$	$\tilde{a} + \frac{a}{2}$	
4	$2_{\bar{z}}$	$2_{\bar{z}}$	$0\frac{1}{2}$	$\frac{1}{2}b$	$\hat{a}$	$\hat{b} + \frac{1}{4}$	$\tilde{a} + \frac{1}{4}$	
$\Gamma_e = 222, 2'2'2, 2'2'2'$								$(\mu 2_{\bar{x}}\mu^{-1} = 2_{\bar{x}} \Rightarrow \mu^2 = \epsilon)$
	$\delta 2_{\bar{x}}\delta^{-1}$	$\mu^{-1}\delta\mu\delta$	$\Phi_e^{2_{\bar{x}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{2_{\bar{y}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{2'_{\bar{z}}}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_m^{\mu}(\mathbf{b}^{(i)})$	$\Phi_m^{\mu}(\mathbf{z})$	$\Phi_{r_8}^{\delta}(\mathbf{z})$
5a	$2_{\bar{x}}$	ϵ	$0\frac{1}{2}$	$\frac{1}{2}0$	$--$	$\hat{a}$	$\hat{b}$	$\tilde{a}$
5b	$2_{\bar{x}}$	ϵ	ab	$\frac{1}{2}\frac{1}{2}$	$--$	$\hat{a}$	$\hat{b}$	$\tilde{a}$
6	$2_{\bar{y}}$	$2_{\bar{z}}$	A_0b	A_1b	$a\frac{1}{2}$	$A_0 + \hat{a}$	$\hat{b}$	$\tilde{a}$
$\Gamma_e = n, n', n1'$								$(\delta n_{\bar{z}}\delta^{-1} = \mu n_{\bar{z}}\mu^{-1} = n_{\bar{z}}, \delta^8 = (\mu^{-1}\delta\mu\delta)^4)$
	$\mu^{-1}\delta\mu\delta$	μ^2	$\Phi_e^{n_{\bar{z}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{\epsilon'}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_m^{\mu}(\mathbf{b}^{(i)})$	$\Phi_m^{\mu}(\mathbf{z})$	$\Phi_{r_8}^{\delta}(\mathbf{z})$	
7	ϵ	ϵ	$a\frac{dj}{N}$	$a'b'$	$\hat{a}$	$\hat{b}$	$\tilde{a}$	
8	ϵ	$n_{\bar{z}}$	$0\frac{j}{n}$	ab	$\hat{a}$	$\hat{b} + \frac{j}{2n}$	$\tilde{a}$	
9	$n_{\bar{z}}$	ϵ	$0\frac{j}{n}$	ab	$\hat{a}$	$\hat{b}$	$\tilde{a} + \frac{j}{2n}$	
			$\frac{1}{2}\frac{dj}{n}$	ab	$\hat{a} + A_0$	$\hat{b}$	$\tilde{a} + \frac{dj}{2n}$	
10	$n_{\bar{z}}$	$n_{\bar{z}}$	$0\frac{j}{n}$	ab	$\hat{a}$	$\hat{b} + \frac{j}{2n}$	$\tilde{a} + \frac{j}{2n}$	

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Table B-6

Spin space-group types on S-lattices with $G = 8mm$. The possible values of N and j are as explained in the caption of Table B-2, and the notation A_0 is explained in the caption of Table B-1. $\hat{a}$ and $\tilde{a}$ denote either 0 or $\frac{1}{2}$. For any choice of spin-space operations $(\mu^{-1}\delta\mu\delta)^4 = \delta^8$. Spin space-group symbols are of the form $S^{\Gamma_e}_{\cdots}8^{\delta}m^{\mu}m^{\delta\mu}$ where the primary 8^{δ} is replaced by 8^{δ}_2 if $\hat{a} = \frac{1}{2}$ and the secondary m^{μ} is replaced by d^{μ} if $\hat{a} = \frac{1}{2}$. The tertiary $m^{\delta\mu}$ is replaced by $c^{\delta\mu}$ if $\tilde{a} = \frac{1}{2}$. A subscript a is added to the secondary m if $\Phi^{\mu}_m(\mathbf{b}^{(i)}) \equiv \hat{a} + A_0$.

$\Gamma_e = 1, 1', 2, 2'$ $(\delta^8 = \epsilon)$

	$\mu^{-1}\delta\mu\delta$	μ^2	$\Phi^{\gamma}_e(\mathbf{k})$	$\Phi^{\mu}_m(\mathbf{b}^{(i)})$	$\Phi^{\mu}_m(\mathbf{z}+\mathbf{h})$	$\Phi^{\delta}_{r_8}(\mathbf{z}+\mathbf{h})$
1	ϵ	ϵ	$0\frac{1}{2}$	$\hat{a}$	$\tilde{a}+\frac{1}{2}\hat{a}$	$\frac{1}{2}\hat{a}$
2	ϵ	$2_{\bar{z}}$	$0\frac{1}{2}$	$\hat{a}$	$\tilde{a}+\frac{1}{2}\hat{a}+\frac{1}{4}$	$\frac{1}{2}\hat{a}$
3	$2_{\bar{z}}$	ϵ	$0\frac{1}{2}$	$\hat{a}$	$\tilde{a}+\frac{1}{2}\hat{a}$	$\frac{1}{2}\hat{a}+\frac{1}{4}$
4	$2_{\bar{z}}$	$2_{\bar{z}}$	$0\frac{1}{2}$	$\hat{a}$	$\tilde{a}+\frac{1}{2}\hat{a}+\frac{1}{4}$	$\frac{1}{2}\hat{a}+\frac{1}{4}$

$\Gamma_e = 222, 2'2'2$ $(\mu 2_{\bar{x}}\mu^{-1} = 2_{\bar{y}} \Rightarrow \mu^2 = 2_{\bar{z}})$

	$\delta 2_{\bar{x}}\delta^{-1}$	$\mu^{-1}\delta\mu\delta$	$\Phi^{2^*_{\bar{x}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{2^*_{\bar{y}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{\mu}_m(\mathbf{b}^{(i)})$	$\Phi^{\mu}_m(\mathbf{z}+\mathbf{h})$	$\Phi^{\delta}_{r_8}(\mathbf{z}+\mathbf{h})$
5	$2_{\bar{y}}$	$2_{\bar{z}}$	$\frac{1}{2}0$	$\frac{1}{2}\frac{1}{2}$	$\hat{a}$	$\tilde{a}+\frac{1}{2}\hat{a}+\frac{1}{4}$	$\frac{1}{2}\hat{a}+\frac{1}{4}$

$\Gamma_e = n, n'$ $(\delta n_{\bar{z}}\delta^{-1} = \mu n_{\bar{z}}\mu^{-1})$

	$\delta n_{\bar{z}}\delta^{-1}$	$\mu^{-1}\delta\mu\delta$	μ^2	δ^8	$\Phi^{n^*_{\bar{z}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{\mu}_m(\mathbf{b}^{(i)})$	$\Phi^{\mu}_m(\mathbf{z}+\mathbf{h})$	$\Phi^{\delta}_{r_8}(\mathbf{z}+\mathbf{h})$
6	$n_{\bar{z}}$	ϵ	ϵ	ϵ	$0\frac{j}{N}$	$\hat{a}$	$\tilde{a}+\frac{1}{2}\hat{a}$	$\frac{1}{2}\hat{a}$
7	$n_{\bar{z}}$	ϵ	$n_{\bar{z}}$	ϵ	$0\frac{j}{n}$	$\hat{a}$	$\tilde{a}+\frac{1}{2}\hat{a}+\frac{j}{2n}$	$\frac{1}{2}\hat{a}$
8	$n_{\bar{z}}$	$n_{\bar{z}}$	ϵ	$n^4_{\bar{z}}$	$0\frac{j}{n}$	$\hat{a}$	$\tilde{a}+\frac{1}{2}\hat{a}$	$\frac{1}{2}\hat{a}+\frac{j}{2n}$
9	$n_{\bar{z}}$	$n_{\bar{z}}$	$n_{\bar{z}}$	$n^4_{\bar{z}}$	$0\frac{j}{n}$	$\hat{a}$	$\tilde{a}+\frac{1}{2}\hat{a}+\frac{j}{2n}$	$\frac{1}{2}\hat{a}+\frac{j}{2n}$
10	$n^{-1}_{\bar{z}}$	ϵ	ϵ	ϵ	$\frac{1}{2}\frac{j}{n}(n=4)$	$\hat{a}$	$\tilde{a}+\frac{1}{2}\hat{a}$	$\frac{1}{2}\hat{a}$
11	$n^{-1}_{\bar{z}}$	$n^{-1}_{\bar{z}}$	ϵ	ϵ	$\frac{1}{2}\frac{j}{n}(n=4)$	$\hat{a}+A_0$	$\tilde{a}+\frac{1}{2}\hat{a}$	$\frac{1}{2}(\frac{1}{2}-\hat{a})-\frac{j}{8}$

Table B-7

Spin space-group types on V-lattices with $G = \bar{8}m2$. The possible values of a, b, a', b', N, j, and d, as well as the notations A_0 and A_1 are as explained in the caption of Table B-1. Lines 4a and 4b refer to distinct spin space-group types if $\Gamma_e = 2'2'2$ but are scale-equivalent if $\Gamma_e = 222$, or $2'2'2'$, for which line 4a suffices. $\hat{a}$ and $\hat{b}$ denote either 0 or $\frac{1}{2}$. Note that since $\bar{8}$ is a generator of G $\delta^8 = \epsilon$. Spin space-group symbols are of the form $P^{\Gamma_e}_{\cdots}\bar{8}^{\delta}m^{\mu}2^{\delta\mu}$ where the secondary m^{μ} is replaced as in Table B-5 above.

$\Gamma_e = 1, 1', 2, 2', 21'$

	$\mu^{-1}\delta\mu\delta$	μ^2	$\Phi^{2^*_{\bar{z}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{\epsilon'}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{\mu}_m(\mathbf{b}^{(i)})$	$\Phi^{\mu}_m(\mathbf{z})$
1	ϵ	ϵ	ab	$a'b'$	$\hat{a}$	$\hat{b}$
2	$2_{\bar{z}}$	ϵ	$\frac{1}{2}0$	$a\frac{1}{2}$	$\hat{a}+A_0$	$\hat{b}$
3	$2_{\bar{z}}$	$2_{\bar{z}}$	$0\frac{1}{2}$	$\frac{1}{2}b$	$\hat{a}$	$\hat{b}+\frac{1}{4}$

$\Gamma_e = 222, 2'2'2, 2'2'2'$ $(\mu^2 = \epsilon, \mu 2_{\bar{x}}\mu^{-1} = 2_{\bar{x}})$

	$\delta 2_{\bar{x}}\delta^{-1}$	$\mu^{-1}\delta\mu\delta$	$\Phi^{2^*_{\bar{x}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{2^*_{\bar{y}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{2'_{\bar{z}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{\mu}_m(\mathbf{b}^{(i)})$	$\Phi^{\mu}_m(\mathbf{z})$
4a	$2_{\bar{x}}$	ϵ	$0\frac{1}{2}$	$\frac{1}{2}0$	$--$	$\hat{a}$	$\hat{b}$
4b	$2_{\bar{x}}$	ϵ	ab	$\frac{1}{2}\frac{1}{2}$	$--$	$\hat{a}$	$\hat{b}$
5	$2_{\bar{y}}$	$2_{\bar{z}}$	A_0b	A_1b	$a\frac{1}{2}$	$\hat{a}+A_0$	$\hat{b}$

$\Gamma_e = n, n', n1'$ $(\delta n_{\bar{z}}\delta^{-1} = n^{-1}_{\bar{z}}, \mu n_{\bar{z}}\mu^{-1} = n_{\bar{z}}, \mu^2 = (\mu^{-1}\delta\mu\delta)^{-1})$

	$\mu^{-1}\delta\mu\delta$	$\Phi^{n^*_{\bar{z}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{\epsilon'}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{\mu}_m(\mathbf{b}^{(i)})$	$\Phi^{\mu}_m(\mathbf{z})$
6	ϵ	$a\frac{dj}{N}$	$a'b'$	$\hat{a}$	$\hat{b}$
7	ϵ	$0\frac{j}{n}$	ab	$\hat{a}$	$\hat{b}+\frac{j}{2n}$

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Table B-8

Spin space-group types on S-lattices with $G = \bar{8}m2$. The possible values of N and j are as explained in the caption of Table B-2. $\hat{a}$ denotes either 0 or $\frac{1}{2}$. Note that since $\bar{8}$ is a generator of G $\delta^8 = \epsilon$. In addition $\mu^2 = (\mu^{-1}\delta\mu\delta)^{-1}$. Spin space-group symbols are of the form $S^{\Gamma_e}_{\cdot\cdot}\bar{8}^{\delta}m^{\mu}2^{\delta\mu}$ where the secondary m^{μ} is replaced as in Table B-6 above.

$\Gamma_e = 1, 1', 2, 2'$					
	$\mu^{-1}\delta\mu\delta$	$\Phi_e^{\gamma}(\mathbf{k})$	$\Phi_m^{\mu}(\mathbf{b}^{(i)})$	$\Phi_m^{\mu}(\mathbf{z}+\mathbf{h})$	
1	ϵ	$0\frac{1}{2}$	$\hat{a}$	$\frac{1}{2}\hat{a}$	
2	$2_{\bar{z}}$	$0\frac{1}{2}$	$\hat{a}$	$\frac{1}{2}\hat{a}+\frac{1}{4}$	
$\Gamma_e = 222, 2'2'2$					$(\delta 2_{\bar{x}}\delta^{-1} = \mu 2_{\bar{x}}\mu^{-1} = 2_{\bar{y}})$
	$\mu^{-1}\delta\mu\delta$	$\Phi_e^{2_x^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{2_y^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_m^{\mu}(\mathbf{b}^{(i)})$	$\Phi_m^{\mu}(\mathbf{z}+\mathbf{h})$
3	$2_{\bar{z}}$	$\frac{1}{2}0$	$\frac{1}{2}\frac{1}{2}$	$\hat{a}$	$\frac{1}{2}\hat{a}+\frac{1}{4}$
$\Gamma_e = n, n'$					$(\delta n_{\bar{z}}d^{-1} = \mu n_{\bar{z}}^{-1}\mu^{-1})$
	$\delta n_{\bar{z}}\delta^{-1}$	$\mu^{-1}\delta\mu\delta$	$\Phi_e^{n_z^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_m^{\mu}(\mathbf{b}^{(i)})$	$\Phi_m^{\mu}(\mathbf{z}+\mathbf{h})$
4	$n_{\bar{z}}^{-1}$	ϵ	$0\frac{j}{N}$	$\hat{a}$	$\frac{1}{2}\hat{a}$
5	$n_{\bar{z}}^{-1}$	$n_{\bar{z}}^{-1}$	$0\frac{j}{n}$	$\hat{a}$	$\frac{1}{2}\hat{a}+\frac{j}{2n}$
6	$n_{\bar{z}}$	ϵ	$\frac{1}{2}\frac{j}{n}(n=4)$	$\hat{a}$	$\frac{1}{2}\hat{a}$

Table B-9

Spin space-group types for V-lattices with $G = 822$. The possible values of a, b, a', b', c, N, j, and d, as well as the notations A_0 and A_1 are as explained in the caption of Table B-1. Lines 4a and 4b refer to distinct spin space-group types if $\Gamma_e = 2'2'2$ but are scale-equivalent if $\Gamma_e = 222$, or $2'2'2'$, for which line 4a suffices. $\grave{a}$ denotes either 0 or $\frac{1}{2}$. Note that $\alpha^2 = \epsilon$. Spin space-group symbols are of the form $P^{\Gamma_e}_{\cdot\cdot}8_c^{\delta}2^{\alpha}2^{\delta\alpha}$, where the secondary 2^{α} is replaced by 2_1^{α} if $\grave{a} = \frac{1}{2}$. An additional subscript a is added to the secondary 2^{α} if $\Phi_d^{\alpha}(\mathbf{b}^{(i)}) = \grave{a} + A_0$.

$\Gamma_e = 1, 1', 2, 2', 21'$							
	$\alpha^{-1}\delta\alpha\delta$	δ^8	$\Phi_e^{2_z^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{\epsilon'}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_d^{\alpha}(\mathbf{b}^{(i)})$	$\Phi_{r_8}^{\delta}(\mathbf{z})$	
1	ϵ	ϵ	ab	$a'b'$	$\grave{a}$	$\frac{c}{8}$	
2	ϵ	$2_{\bar{z}}$	$0\frac{1}{2}$	$\frac{1}{2}a$	$\grave{a}$	$\frac{c}{8}+\frac{1}{16}$	
3	$2_{\bar{z}}$	ϵ	$\frac{1}{2}0$	$a\frac{1}{2}$	$\grave{a}+A_0$	$\frac{c}{8}$	
$\Gamma_e = 222, 2'2'2, 2'2'2'$							$(\alpha 2_{\bar{x}}\alpha^{-1} = 2_{\bar{x}})$
	$\delta 2_{\bar{x}}\delta^{-1}$	$\alpha^{-1}\delta\alpha\delta$	$\Phi_e^{2_x^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{2_y^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{2_z'}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_d^{\alpha}(\mathbf{b}^{(i)})$	$\Phi_{r_8}^{\delta}(\mathbf{z})$
4a	$2_{\bar{x}}$	ϵ	$0\frac{1}{2}$	$\frac{1}{2}0$	$--$	$\grave{a}$	$\frac{c}{8}$
4b			ab	$\frac{1}{2}\frac{1}{2}$	$--$	$\grave{a}$	$\frac{c}{8}$
5	$2_{\bar{y}}$	$2_{\bar{z}}$	A_0b	A_1b	$a\frac{1}{2}$	$\grave{a}+A_0$	$\frac{c}{8}$
$\Gamma_e = n, n', n1'$							$(\delta n_{\bar{z}}\delta^{-1} = n_{\bar{z}}, \alpha n_{\bar{z}}\alpha^{-1} = n_{\bar{z}}^{-1}, \alpha^{-1}\delta\alpha\delta = \epsilon)$
	δ^8	$\Phi_e^{n_z^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{\epsilon'}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_d^{\alpha}(\mathbf{b}^{(i)})$	$\Phi_{r_8}^{\delta}(\mathbf{z})$		
6	ϵ	$a\frac{dj}{N}$	$a'b'$	$\grave{a}$	$\frac{c}{8}$		
7	$n_{\bar{z}}$	$0\frac{j}{n}$	ab	$\grave{a}$	$\frac{c}{8}+\frac{j}{8n}$		
8	$n_{\bar{z}}^3$	$0\frac{j}{n}$	ab	$\grave{a}$	$\frac{c}{8}+\frac{3j}{8n}$		
9	$n_{\bar{z}}^2$	$a\frac{dj}{N}$	$a'b'$	$\grave{a}$	$\frac{c}{8}+\frac{dj}{4N}$		
10	$n_{\bar{z}}^4$	$a\frac{dj}{N}$	$a'b'$	$\grave{a}$	$\frac{c}{8}+\frac{dj}{2N}$		

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Table B-10

Spin space-group types for S-lattices with $G = 822$. The possible values of c', N and j are explained in the caption Table B-2. Note that $\alpha^{-1}\delta\alpha\delta = \alpha^2$. Spin space-group symbols are of the form $S^{\Gamma_e}_{\ldots}8^{\delta}_{c'}2^{\alpha}2^{\delta\alpha}$, where the secondary 2^{α} is replaced by 2^{α}_1 if $\Phi^{\alpha}_d(\mathbf{b}^{(i)}) \equiv \frac{1}{2}$.

$\Gamma_e = 1, 1', 2, 2'$					
	$\alpha^{-1}\delta\alpha\delta$	δ^8	$\Phi^{\gamma}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{\alpha}_d(\mathbf{b}^{(i)})$	$\Phi^{\delta}_{r_8}(\mathbf{z}+\mathbf{h})$
1	ϵ	ϵ	$0\frac{1}{2}$	0	$\frac{c'}{8}$
2	ϵ	$2_{\bar{z}}$	$0\frac{1}{2}$	0	$\frac{c'}{8}+\frac{1}{16}$
3	$2_{\bar{z}}$	ϵ	$0\frac{1}{2}$	$\frac{1}{2}$	$\frac{c'}{8}$
$\Gamma_e = 222, 2'2'2$	$(\delta \in 4221' \Rightarrow \delta^8 = \epsilon, \delta 2_{\bar{x}}\delta^{-1} = \alpha 2_{\bar{x}}\alpha^{-1} = 2_{\bar{y}})$				
	$\alpha^{-1}\delta\alpha\delta$	$\Phi^{2^*_{\bar{z}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{2^*_{\bar{y}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{\alpha}_d(\mathbf{b}^{(i)})$	$\Phi^{\delta}_{r_8}(\mathbf{z}+\mathbf{h})$
4	$2_{\bar{z}}$	$\frac{1}{2}0$	$\frac{1}{2}\frac{1}{2}$	$\frac{1}{2}$	$\frac{c'}{8}$
$\Gamma_e = n, n'$	$(\delta n_{\bar{z}}\delta^{-1} = \alpha n^{-1}_{\bar{z}}\alpha^{-1}, \alpha^{-1}\delta\alpha\delta = \alpha^2 = \epsilon)$				
	$\delta n_{\bar{z}}\delta^{-1}$	δ^8	$\Phi^{n^*_{\bar{z}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{\alpha}_d(\mathbf{b}^{(i)})$	$\Phi^{\delta}_{r_8}(\mathbf{z}+\mathbf{h})$
5	$n_{\bar{z}}$	ϵ	$0\frac{j}{N}$	0	$\frac{c'}{8}$
6	$n_{\bar{z}}$	$n_{\bar{z}}$	$0\frac{j}{n}$	0	$\frac{c'}{8}+\frac{j}{8n}$
7	$n_{\bar{z}}$	$n^2_{\bar{z}}$	$0\frac{j}{N}$	0	$\frac{c'}{8}+\frac{j}{4N}$
8	$n_{\bar{z}}$	$n^3_{\bar{z}}$	$0\frac{j}{n}$	0	$\frac{c'}{8}+\frac{3j}{8n}$
9	$n_{\bar{z}}$	$n^4_{\bar{z}}$	$0\frac{j}{N}$	0	$\frac{c'}{8}+\frac{j}{2N}$
10	$n^{-1}_{\bar{z}}$	ϵ	$\frac{1}{2}\frac{j}{n}(n=4)$	0	$\frac{c'}{8}$

Table B-11

Spin space-group types on V-lattices with $G = \bar{8}2m$. The possible values of a, b, a', b', N, j, and d, as well as the notations A_0 and A_1 are as explained in the caption of Table B-1. Lines 3a and 3b refer to distinct spin space-group types if $\Gamma_e = 2'2'2$ but are scale-equivalent if $\Gamma_e = 222$, or $2'2'2'$, for which line 3a suffices. $\grave{a}$ and $\grave{b}$ denote either 0 or $\frac{1}{2}$. Note that for all choices of spin-space operations $\delta^8 = \epsilon$ and $\alpha^2 = \epsilon$. Spin space-group symbols are of the form $P^{\Gamma_e}_{\ldots}\bar{8}^{\delta}2^{\alpha}m^{\delta\alpha}$ where 2^{α} is replaced by 2^{α}_1 if $\grave{a} = \frac{1}{2}$, and $m^{\delta\alpha}$ is replaced by $c^{\delta\alpha}$ if $\grave{b} = \frac{1}{2}$. A subscript a is added to the secondary 2 if $\Phi^{\alpha}_d(\mathbf{b}^{(i)}) \equiv \grave{a} + A_0$.

$\Gamma_e = 1, 1', 2, 2', 21'$							
	$\alpha^{-1}\delta\alpha\delta$	$\Phi^{2^*_{\bar{z}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{\epsilon'}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{\alpha}_d(\mathbf{b}^{(i)})$	$\Phi^{\alpha}_d(\mathbf{z})$		
1	ϵ	ab	$a'b'$	$\grave{a}$	$\grave{b}$		
2	$2_{\bar{z}}$	$0\frac{1}{2}$	$a'b'$	$\grave{a}$	$\grave{b}+\frac{1}{4}$		
		$\frac{1}{2}b$	$a'b'$	$\grave{a}+A_0$	$\grave{b}+\frac{1}{2}a$		
$\Gamma_e = 222, 2'2'2, 2'2'2'$						$(\alpha 2_{\bar{x}}\alpha^{-1} = 2_{\bar{x}})$	
	$\delta 2_{\bar{x}}\delta^{-1}$	$\alpha^{-1}\delta\alpha\delta$	$\Phi^{2^*_{\bar{x}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{2^*_{\bar{y}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{2'_{\bar{z}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{\alpha}_d(\mathbf{b}^{(i)})$	$\Phi^{\alpha}_d(\mathbf{z})$
3a	$2_{\bar{x}}$	ϵ	$0\frac{1}{2}$	$\frac{1}{2}0$	$--$	$\grave{a}$	$\grave{b}$
3b			ab	$\frac{1}{2}\frac{1}{2}$	$--$	$\grave{a}$	$\grave{b}$
4	$2_{\bar{y}}$	$2_{\bar{z}}$	A_0b	A_1b	$a\frac{1}{2}$	$\grave{a}+A_0$	$\grave{b}$
$\Gamma_e = n, n', n1'$					$(\delta n_{\bar{z}}\delta^{-1} = \alpha n_{\bar{z}}\alpha^{-1} = n^{-1}_{\bar{z}})$		
	$\alpha^{-1}\delta\alpha\delta$	$\Phi^{n^*_{\bar{z}}}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{\epsilon'}_e(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi^{\alpha}_d(\mathbf{b}^{(i)})$	$\Phi^{\alpha}_d(\mathbf{z})$		
5	ϵ	$a\frac{dj}{N}$	$a'b'$	$\grave{a}$	$\grave{b}$		
6	$n_{\bar{z}}$	$0\frac{j}{n}$	$a'b'$	$\grave{a}$	$\grave{b}-\frac{j}{2n}$		
		$\frac{1}{2}\frac{dj}{n}$	$a'b'$	$\grave{a}+A_0$	$\grave{b}-\frac{dj}{2n}$		

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Table B-12

Spin space-group types for S-lattices with $G = \bar{8}2m$. The possible values of N and j are explained in the caption of Table B-2, and the notation A_0 is as explained in the caption of Table B-1. $\grave{b}$ denotes either 0 or $\frac{1}{2}$. Note that since $\bar{8}$ is a generator of G $\delta^8 = \epsilon$. Spin space-group symbols are $S^{\Gamma_e}_{\ldots}\bar{8}^{\delta}2^{\alpha}m^{\delta\alpha}$ if $\grave{b} = 0$ and $S^{\Gamma_e}_{\ldots}\bar{8}^{\delta}2^{\alpha}c^{\delta\alpha}$ if $\grave{b} = \frac{1}{2}$. The secondary 2 is replaced by 2_1 if $\Phi_d^{\alpha}(\mathbf{b}^{(i)}) \equiv \frac{1}{2}$ and by 2_a if $\Phi_d^{\alpha}(\mathbf{b}^{(i)}) \equiv 0\frac{1}{2}0\frac{1}{2}$.

$\Gamma_e = 1, 1', 2, 2'$					
	$\alpha^{-1}\delta\alpha\delta$	α^2	$\Phi_e^{\gamma}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_d^{\alpha}(\mathbf{b}^{(i)})$	$\Phi_d^{\alpha}(\mathbf{z}+\mathbf{h})$
1	ϵ	ϵ	$0\frac{1}{2}$	0	$\grave{b}$
2	ϵ	$2_{\bar{z}}$	$0\frac{1}{2}$	$\frac{1}{2}$	$\grave{b}+\frac{1}{4}$
3	$2_{\bar{z}}$	ϵ	$0\frac{1}{2}$	0	$\grave{b}-\frac{1}{4}$
4	$2_{\bar{z}}$	$2_{\bar{z}}$	$0\frac{1}{2}$	$\frac{1}{2}$	$\grave{b}$
$\Gamma_e = 222, 2'2'2$	$(\delta 2_{\bar{x}}\delta^{-1} = \alpha 2_{\bar{x}}\alpha^{-1} = 2_{\bar{y}} \Rightarrow \alpha^{-1}\delta\alpha\delta = \alpha^2 = \epsilon)$				
	$\Phi_e^{2_x^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{2_y^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_d^{\alpha}(\mathbf{b}^{(i)})$	$\Phi_d^{\alpha}(\mathbf{z}+\mathbf{h})$	
5	$\frac{1}{2}0$	$\frac{1}{2}\frac{1}{2}$	$\frac{1}{2}$	$\grave{b}$	
$\Gamma_e = n, n'$	$(\delta n_{\bar{z}}\delta^{-1} = \alpha n_{\bar{z}}\alpha^{-1}, \alpha^2 = \epsilon)$				
	$\delta n_{\bar{z}}\delta^{-1}$	$\alpha^{-1}\delta\alpha\delta$	$\Phi_e^{n_z^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_d^{\alpha}(\mathbf{b}^{(i)})$	$\Phi_d^{\alpha}(\mathbf{z}+\mathbf{h})$
6	$n_{\bar{z}}^{-1}$	ϵ	$0\frac{j}{N}$	0	$\grave{b}-\frac{j}{2N}$
7	$n_{\bar{z}}^{-1}$	$n_{\bar{z}}$	$0\frac{j}{n}$	0	$\grave{b}-\frac{j}{2n}$
8	$n_{\bar{z}}$	ϵ	$\frac{1}{2}\frac{j}{n}(n=4)$	A_0	$\grave{b}$
9	$n_{\bar{z}}$	$n_{\bar{z}}$	$\frac{1}{2}\frac{j}{n}(n=4)$	A_0	$\grave{b}-\frac{j}{8}$

Table B-13

Spin space-group types on V-lattices with $G = 8/m$. The possible values of a, b, a', b', N, j, and d, as well as the notations A_0 and A_1 are as explained in the caption of Table B-1. Lines 3a and 3b refer to distinct spin space-group types if $\Gamma_e = 2'2'2$ but are scale-equivalent if $\Gamma_e = 222$, or $2'2'2'$, for which line 3a suffices. $\breve{a}$ and $\tilde{a}$ denote either 0 or $\frac{1}{2}$. Note that $\eta^2 = \epsilon$. Spin space-group symbols are of the form $P^{\Gamma_e}_{\ldots}8^{\delta}/m^{\eta}$ where 8^{δ} is replaced by 8_4^{δ} if $\tilde{a} = \frac{1}{2}$ and m^{η} is replaced by n^{η} if $\breve{a} = \frac{1}{2}$, a subscript a is added if $\Phi_h^{\eta}(\mathbf{b}^{(i)}) \equiv \breve{a} + A_0$.

$\Gamma_e = 1, 1', 2, 2', 21'$					$(\delta^8 = \epsilon)$	
	$\delta^{-1}\eta\delta\eta$	$\Phi_e^{2_z^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{\epsilon'}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_h^{\eta}(\mathbf{b}^{(i)})$	$\Phi_{r_8}^{\delta}(\mathbf{z})$	
1	ϵ	ab	$a'b'$	$\breve{a}$	$\tilde{a}$	
2	$2_{\bar{z}}$	$0\frac{1}{2}$	$\frac{1}{2}b$	$\breve{a}$	$\tilde{a}+\frac{1}{4}$	
		$\frac{1}{2}b$	$a'b'$	$\breve{a}+A_0$	$\tilde{a}+\frac{b}{2}$	
$\Gamma_e = 222, 2'2'2, 2'2'2'$			$(\eta 2_{\bar{x}}\eta^{-1} = 2_{\bar{x}}, \delta^{-1}\eta\delta\eta = \delta^8 = \epsilon)$			
	$\delta 2_{\bar{x}}\delta^{-1}$	$\Phi_e^{2_x^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{2_y^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{2_z'}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_h^{\eta}(\mathbf{b}^{(i)})$	$\Phi_{r_8}^{\delta}(\mathbf{z})$
3a	$2_{\bar{x}}$	$0\frac{1}{2}$	$\frac{1}{2}0$	$--$	$\breve{a}$	$\tilde{a}$
3b		ab	$\frac{1}{2}\frac{1}{2}$	$--$	$\breve{a}$	$\tilde{a}$
4	$2_{\bar{y}}$	A_0b	A_1b	$a\frac{1}{2}$	$\breve{a}$	$\tilde{a}$
$\Gamma_e = n, n'$		$(\delta n_{\bar{z}}\delta^{-1} = n_{\bar{z}}, \eta n_{\bar{z}}\eta^{-1} = n_{\bar{z}}^{-1}, \delta^8 = (\delta^{-1}\eta\delta\eta)^{-4})$				
	$\delta^{-1}\eta\delta\eta$	$\Phi_e^{n_z^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{\epsilon'}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_h^{\eta}(\mathbf{b}^{(i)})$	$\Phi_{r_8}^{\delta}(\mathbf{z})$	
5	ϵ	$a\frac{dj}{N}$	$a'b'$	$\breve{a}$	$\tilde{a}$	
6	$n_{\bar{z}}^{-1}$	$0\frac{j}{n}$	ab	$\breve{a}$	$\tilde{a}$	
		$\frac{1}{2}\frac{dj}{n}$	ab	$\breve{a}+A_0$	$\tilde{a}+\frac{dj}{2n}$	

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Table B-14

Spin space-group types on S-lattices with $G = 8/m$. The possible values of N and j are explained in the caption of Table B-2, and the notation A_0 is explained in the caption of Table B-1. Note that $\eta^2 = \epsilon$. $\breve{a}$ denotes either 0 or $\frac{1}{2}$. Spin space-group symbols are $S^{\Gamma_e}_{\cdots}8^{\delta}/m^{\eta}$ if $\breve{a} \equiv 0$ and $S^{\Gamma_e}_{\cdots}8^{\delta}_{2}/a^{\eta}$ if $\breve{a} \equiv \frac{1}{2}$.

$\Gamma_e = 1, 1', 2, 2'$					$(\delta^8 = \epsilon)$
	$\delta^{-1}\eta\delta\eta$	$\Phi_e^{\gamma}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_h^{\eta}(\mathbf{b}^{(i)})$	$\Phi_{r_8}^{\delta}(\mathbf{z}+\mathbf{h})$	
1	ϵ	$0\frac{1}{2}$	$\breve{a}$	$\frac{1}{2}\breve{a}$	
2	$2_{\bar{z}}$	$0\frac{1}{2}$	$\breve{a}$	$\frac{1}{2}\breve{a} + \frac{1}{4}$	
$\Gamma_e = 222, 2'2'2$					$(\eta 2_{\bar{x}}\eta^{-1} = 2_{\bar{x}}, \delta^{-1}\eta\delta\eta = \delta^8 = \epsilon)$
	$\delta 2_{\bar{x}}\delta^{-1}$	$\Phi_e^{2_{\bar{x}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{2_{\bar{y}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_h^{\eta}(\mathbf{b}^{(i)})$	$\Phi_{r_8}^{\delta}(\mathbf{z}+\mathbf{h})$
3	$2_{\bar{y}}$	$\frac{1}{2}0$	$\frac{1}{2}\frac{1}{2}$	$\breve{a}$	$\frac{1}{2}\breve{a}$
$\Gamma_e = n, n'$					$(\eta n_{\bar{z}}\eta^{-1} = n_{\bar{z}}^{-1}, \delta^8 = (\delta^{-1}\eta\delta\eta)^{-4})$
	$\delta n_{\bar{z}}\delta^{-1}$	$\delta^{-1}\eta\delta\eta$	$\Phi_e^{n_{\bar{z}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_h^{\eta}(\mathbf{b}^{(i)})$	$\Phi_{r_8}^{\delta}(\mathbf{z}+\mathbf{h})$
4	$n_{\bar{z}}$	ϵ	$0\frac{j}{N}$	$\breve{a}$	$\frac{1}{2}\breve{a}$
5	$n_{\bar{z}}$	$n_{\bar{z}}^{-1}$	$0\frac{j}{n}$	$\breve{a}$	$\frac{1}{2}\breve{a} + \frac{j}{2n}$
6	$n_{\bar{z}}^{-1}$	ϵ	$\frac{1}{2}\frac{j}{n}(n=4)$	$\breve{a}$	$\frac{1}{2}\breve{a}$
7	$n_{\bar{z}}^{-1}$	$n_{\bar{z}}^{-1}$	$\frac{1}{2}\frac{j}{n}(n=4)$	$\breve{a} + A_0$	$\frac{1}{2}\breve{a} - \frac{1}{2}\frac{j}{n}(n=4)$

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Table B-15

Spin space-group types on V-lattices with $G = 8/mmm$. The possible values of a, b, a', b', N, j, and d, as well as the notations A_0 and A_1 are explained in the caption of Table B-1. Lines 7a and 7b refer to distinct spin space-group types if $\Gamma_e = 2'2'2$ but are scale-equivalent if $\Gamma_e = 222$, or $2'2'2'$, for which line 7a suffices. Note that $\eta^2 = \eta^{-1}\mu\eta\mu = \epsilon$. $\hat{a}$, $\hat{b}$, $\check{a}$, $\tilde{a}$ and $\tilde{b}$ denote either 0 or $\frac{1}{2}$. Spin space-group symbols are of the form $P^{\Gamma_e}_{\cdots}8^{\delta}/m^{\eta}m^{\mu}m^{\delta\mu}$, where 8^{δ} and m^{η} are replaced as in Table B-13 above, and m^{μ} and $m^{\delta\mu}$ are replaced as in Table B-5 above.

$\Gamma_e = 1, 1', 2, 2', 21'$ $\quad (\eta^{-1}\mu\eta\mu = \eta^2 = \delta^8 = \epsilon)$

	$\mu^{-1}\delta\mu\delta$	$\delta^{-1}\eta\delta\eta$	μ^2	$\Phi_e^{2_{\bar{z}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{\epsilon'}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_m^{\mu}(\mathbf{b}^{(i)})$	$\Phi_m^{\mu}(\mathbf{z})$	$\Phi_h^{\eta}(\mathbf{b}^{(i)})$	$\Phi_{r_8}^{\delta}(\mathbf{z})$
1	ϵ	ϵ	ϵ	ab	$a'b'$	$\hat{a}$	$\hat{b}$	$\check{a}$	$\tilde{a}$
2	ϵ	ϵ	$2_{\bar{z}}$	$0\frac{1}{2}$	$\frac{1}{2}b'$	$\hat{a}$	$\hat{b}+\frac{1}{4}$	$\check{a}$	$\tilde{a}$
3	ϵ	$2_{\bar{z}}$	ϵ	$\frac{1}{2}0$	$a'\frac{1}{2}$	$\hat{a}$	$\hat{b}$	$\check{a}+A_0$	$\tilde{a}$
4	$2_{\bar{z}}$	ϵ	ϵ	$\frac{1}{2}0$	$a'\frac{1}{2}$	$\hat{a}+A_0$	$\hat{b}$	$\check{a}$	$\tilde{a}$
5	$2_{\bar{z}}$	$2_{\bar{z}}$	ϵ	$0\frac{1}{2}$	$\frac{1}{2}b'$	$\hat{a}$	$\hat{b}$	$\check{a}$	$\tilde{a}+\frac{1}{4}$
				$\frac{1}{2}b$	$a'b'$	$\hat{a}+A_0$	$\hat{b}$	$\check{a}+A_0$	$\tilde{a}+\frac{b}{2}$
6	$2_{\bar{z}}$	$2_{\bar{z}}$	$2_{\bar{z}}$	$0\frac{1}{2}$	$\frac{1}{2}b'$	$\hat{a}$	$\hat{b}+\frac{1}{4}$	$\check{a}$	$\tilde{a}+\frac{1}{4}$

$\Gamma_e = 222, 2'2'2, 2'2'2'$ $\quad (\mu 2_{\bar{x}}\mu^{-1} = \eta 2_{\bar{x}}\eta^{-1} = 2_{\bar{x}} \Rightarrow \mu^2 = \epsilon)$

	$\delta 2_{\bar{x}}\delta^{-1}$	$\mu^{-1}\delta\mu\delta$	$\delta^{-1}\eta\delta\eta$	$\Phi_e^{2_{\bar{x}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{2_{\bar{y}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{2'_{\bar{z}}}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_m^{\mu}(\mathbf{b}^{(i)})$	$\Phi_m^{\mu}(\mathbf{z})$	$\Phi_h^{\eta}(\mathbf{b}^{(i)})$	$\Phi_{r_8}^{\delta}(\mathbf{z})$
7a	$2_{\bar{x}}$	ϵ	ϵ	$0\frac{1}{2}$	$\frac{1}{2}0$	$--$	$\hat{a}$	$\hat{b}$	$\check{a}$	$\tilde{b}$
7b				ab	$\frac{1}{2}\frac{1}{2}$	$--$	$\hat{a}$	$\hat{b}$	$\check{a}$	$\tilde{b}$
8	$2_{\bar{y}}$	$2_{\bar{z}}$	ϵ	$A_0 b$	$A_1 b$	$a\frac{1}{2}$	$\hat{a}+A_0$	$\hat{b}$	$\check{a}$	$\tilde{b}$

$\Gamma_e = n, n', n1'$ $\quad (\delta n_{\bar{z}}\delta^{-1} = \mu n_{\bar{z}}\mu^{-1} = n_{\bar{z}}, \eta n_{\bar{z}}\eta^{-1} = n_{\bar{z}}^{-1}, \delta^8 = (\mu^{-1}\delta\mu\delta)^4, (\delta^{-1}\eta\delta\eta)^{-1} = \mu^{-1}\delta\mu\delta)$

	$\mu^{-1}\delta\mu\delta$	μ^2	$\Phi_e^{n_{\bar{z}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{\epsilon'}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_m^{\mu}(\mathbf{b}^{(i)})$	$\Phi_m^{\mu}(\mathbf{z})$	$\Phi_h^{\eta}(\mathbf{b}^{(i)})$	$\Phi_{r_8}^{\delta}(\mathbf{z})$
9	ϵ	ϵ	$a\frac{dj}{N}$	$a'b'$	$\hat{a}$	$\hat{b}$	$\check{a}$	$\tilde{b}$
10	ϵ	$n_{\bar{z}}$	$0\frac{j}{n}$	$a'b'$	$\hat{a}$	$\hat{b}+\frac{j}{2n}$	$\check{a}$	$\tilde{b}$
11	$n_{\bar{z}}$	ϵ	$0\frac{j}{n}$	$a'b'$	$\hat{a}$	$\hat{b}$	$\check{a}$	$\tilde{b}+\frac{j}{2n}$
			$\frac{1}{2}\frac{dj}{n}$	$a'b'$	$\hat{a}+A_0$	$\hat{b}$	$\check{a}+A_0$	$\tilde{b}+\frac{dj}{2n}$
12	$n_{\bar{z}}$	$n_{\bar{z}}$	$0\frac{j}{n}$	$a'b'$	$\hat{a}$	$\hat{b}+\frac{j}{2n}$	$\check{a}$	$\tilde{b}+\frac{j}{2n}$

Table B-16

Spin space-group types on S-lattices with $G = 8/mmm$. The possible values of N and j are explained in the caption of Table B-2, and the notation A_0 is explained in the caption of Table B-1. Note that $\eta^2 = \epsilon$. $\tilde{a}$ and $\tilde{b}$ denote either 0 or $\frac{1}{2}$. Spin space-group symbols are $S^{\Gamma_e}_{\ldots}8^{\delta}/m^{\eta}m^{\mu}m^{\delta\mu}$ if $\tilde{a} = \tilde{b} = 0$, $S^{\Gamma_e}_{\ldots}8^{\delta}/m^{\eta}m^{\mu}c^{\delta\mu}$ if $\tilde{a} = 0$ and $\tilde{b} = \frac{1}{2}$, $S^{\Gamma_e}_{\ldots}8^{\delta}/n^{\eta}d^{\mu}m^{\delta\mu}$ if $\tilde{a} = \frac{1}{2}$ and $\tilde{b} = 0$ and $S^{\Gamma_e}_{\ldots}8^{\delta}/n^{\eta}d^{\mu}c^{\delta\mu}$ if $\tilde{a} = \tilde{b} = \frac{1}{2}$. For example, if $\Gamma_e = 7$, $G_\epsilon = 4mm$ and $\Gamma = (14)2'2'$ the spin-space operations can be chosen to be $\delta = (14)_{\bar{z}}$ and $\eta = 2'_{\bar{x}}$, μ is necessarily ϵ since $m \in G_\epsilon$. The corresponding line in the Table is 12, if $\tilde{a} = 0$, $\tilde{b} = \frac{1}{2}$ and $\Phi_e^{7_{\bar{z}}}(\mathbf{z}+\mathbf{h}) \equiv \frac{2}{7}$, the spin space-group symbol is $S^{7}_{7_2C}8^{14}m^{2_{\bar{x}}}mc^{14}$.

$\Gamma_e = 1, 1', 2, 2'$ $(\eta^2 = \delta^8 = \epsilon)$

	$\mu^{-1}\delta\mu\delta$	$\delta^{-1}\eta\delta\eta$	$\eta^{-1}\mu\eta\mu$	μ^2	$\Phi_e^{\gamma}(\mathbf{k})$	$\Phi_m^{\mu}(\mathbf{b}^{(i)})$	$\Phi_m^{\mu}(\mathbf{z}+\mathbf{h})$	$\Phi_h^{\eta}(\mathbf{b}^{(i)})$	$\Phi_{r_8}^{\delta}(\mathbf{z}+\mathbf{h})$
1	ϵ	ϵ	ϵ	ϵ	$0\frac{1}{2}$	$\tilde{a}$	$\frac{\tilde{a}}{2}+\tilde{b}$	$\tilde{a}$	$\frac{\tilde{a}}{2}$
2	ϵ	ϵ	ϵ	$2_{\bar{z}}$	$0\frac{1}{2}$	$\tilde{a}$	$\frac{\tilde{a}}{2}+\tilde{b}+\frac{1}{4}$	$\tilde{a}$	$\frac{\tilde{a}}{2}$
3	ϵ	$2_{\bar{z}}$	$2_{\bar{z}}$	ϵ	$0\frac{1}{2}$	$\tilde{a}$	$\frac{\tilde{a}}{2}+\tilde{b}$	$\tilde{a}+\frac{1}{2}$	$\frac{ta}{2}$
4	$2_{\bar{z}}$	ϵ	$2_{\bar{z}}$	ϵ	$0\frac{1}{2}$	$\tilde{a}$	$\frac{\tilde{a}}{2}+\tilde{b}$	$\tilde{a}+\frac{1}{2}$	$\frac{\tilde{a}}{2}+\frac{1}{4}$
5	$2_{\bar{z}}$	ϵ	$2_{\bar{z}}$	$2_{\bar{z}}$	$0\frac{1}{2}$	$\tilde{a}$	$\frac{\tilde{a}}{2}+\tilde{b}+\frac{1}{4}$	$\tilde{a}+\frac{1}{2}$	$\frac{\tilde{a}}{2}+\frac{1}{4}$
6	$2_{\bar{z}}$	$2_{\bar{z}}$	ϵ	ϵ	$0\frac{1}{2}$	$\tilde{a}$	$\frac{\tilde{a}}{2}+\tilde{b}$	$\tilde{a}$	$\frac{\tilde{a}}{2}+\frac{1}{4}$
7	$2_{\bar{z}}$	$2_{\bar{z}}$	ϵ	$2_{\bar{z}}$	$0\frac{1}{2}$	$\tilde{a}$	$\frac{\tilde{a}}{2}+\tilde{b}+\frac{1}{4}$	$\tilde{a}$	$\frac{\tilde{a}}{2}+\frac{1}{4}$

$\Gamma_e = 222, 2'2'2$ $(\mu 2_{\bar{x}}\mu^{-1} = \delta 2_{\bar{x}}\delta^{-1} = 2_{\bar{y}}, \eta 2_{\bar{x}}\eta^{-1} = 2_{\bar{x}})$

	$\mu^{-1}\delta\mu\delta$	$\delta^{-1}\eta\delta\eta$	$\eta^{-1}\mu\eta\mu$	μ^2	$\Phi_e^{2_{\bar{x}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_e^{2_{\bar{y}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_m^{\mu}(\mathbf{b}^{(i)})$	$\Phi_m^{\mu}(\mathbf{z}+\mathbf{h})$	$\Phi_h^{\eta}(\mathbf{b}^{(i)})$	$\Phi_{r_8}^{\delta}(\mathbf{z}+\mathbf{h})$
8	$2_{\bar{z}}$	ϵ	$2_{\bar{z}}$	$2_{\bar{z}}$	$\frac{1}{2}0$	$\frac{1}{2}\frac{1}{2}$	$\tilde{a}$	$\frac{\tilde{a}}{2}+\tilde{b}+\frac{1}{4}$	$\tilde{a}+\frac{1}{2}$	$\frac{\tilde{a}}{2}+\frac{1}{4}$

$\Gamma_e = n, n'$ $(\eta n_{\bar{z}}\eta^{-1} = n_{\bar{z}}^{-1}, \delta n_{\bar{z}}\delta^{-1} = \mu n_{\bar{z}}\mu^{-1}, \mu^{-1}\delta\mu\delta = (\delta^{-1}\eta\delta\eta)^{-1}, \eta^{-1}\mu\eta\mu = \epsilon, \delta^8 = (\mu^{-1}\delta\mu\delta)^4)$

	$\delta n_{\bar{z}}\delta^{-1}$	$\mu^{-1}\delta\mu\delta$	μ^2	$\Phi_e^{n_{\bar{z}}^*}(\mathbf{b}^{(i)}\mathbf{c})$	$\Phi_m^{\mu}(\mathbf{b}^{(i)})$	$\Phi_m^{\mu}(\mathbf{z}+\mathbf{h})$	$\Phi_h^{\eta}(\mathbf{b}^{(i)})$	$\Phi_{r_8}^{\delta}(\mathbf{z}+\mathbf{h})$
9	$n_{\bar{z}}$	ϵ	ϵ	$0\frac{j}{N}$	$\tilde{a}$	$\frac{\tilde{a}}{2}+\tilde{b}$	$\tilde{a}$	$\frac{\tilde{a}}{2}$
10	$n_{\bar{z}}$	ϵ	$n_{\bar{z}}$	$0\frac{j}{n}$	$\tilde{a}$	$\frac{\tilde{a}}{2}+\frac{j}{2n}+\tilde{b}$	$\tilde{a}$	$\frac{\tilde{a}}{2}$
11	$n_{\bar{z}}$	$n_{\bar{z}}$	ϵ	$0\frac{j}{n}$	$\tilde{a}$	$\frac{\tilde{a}}{2}+\tilde{b}$	$\tilde{a}$	$\frac{\tilde{a}}{2}+\frac{j}{2n}$
12	$n_{\bar{z}}$	$n_{\bar{z}}$	$n_{\bar{z}}$	$0\frac{j}{n}$	$\tilde{a}$	$\frac{\tilde{a}}{2}+\frac{j}{2n}+\tilde{b}$	$\tilde{a}$	$\frac{\tilde{a}}{2}+\frac{j}{2n}$
13	$n_{\bar{z}}^{-1}$	ϵ	ϵ	$\frac{1}{2}\frac{j}{n}(n=4)$	$\tilde{a}$	$\frac{\tilde{a}}{2}+\tilde{b}$	$\tilde{a}$	$\frac{\tilde{a}}{2}$
14	$n_{\bar{z}}^{-1}$	$n_{\bar{z}}^{-1}$	ϵ	$\frac{1}{2}\frac{j}{n}(n=4)$	$\tilde{a}+A_0$	$\frac{\tilde{a}}{2}+\tilde{b}$	$\tilde{a}+A_0$	$\frac{\tilde{a}}{2}-\frac{1}{4}$
15	$n_{\bar{z}}^{-1}$	$n_{\bar{z}}$	ϵ	$\frac{1}{2}\frac{j}{n}(n=4)$	$\tilde{a}+A_0$	$\frac{\tilde{a}}{2}+\tilde{b}$	$\tilde{a}+A_0$	$\frac{\tilde{a}}{2}+\frac{1}{4}$

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Appendix C. Octagonal spin space-group types: Identification of the spin point-group generators [Not to be included in the printed version of the paper]

The following Tables list all the 3-dimensional octagonal spin space-group types, explicitly identifying the spin-space operations δ, μ, η, and α appearing in the spin point-group generators. There are a total of 16 tables, one for each combination of point group G and lattice type. The first few columns of each table give the structure of the spin point group G_S by listing Γ_e, G_ϵ, Γ, and the quotient group G/G_ϵ. Following these is a column that explicitly lists the generators (r_8, δ), $(\overline{r}_8, \delta)$, (m, μ), (d, α), and (h, η). The last column in each table refers to a line in the corresponding spin space-group table in Appendix B. (Tables B-1–B-16), which gives the possible values of all the phase functions for the generators of the spin point group, as well as a rule for generating the spin space-group symbol.

Table C-1: Explicit list of octagonal spin space-group types with $G = 8$ on V-lattices. The last column refers to line numbers in Table B-1, where the possible phase functions are listed, and rules are given to generate the spin space-group symbol.

Γ_e	G_ϵ	G/G_ϵ	Γ	generator	*line*
1	8	1	1	(r_8, ϵ)	1
	4	2	2^*	$(r_8, 2^*_z)$	1
			$1'$	(r_8, ϵ')	1
	2	4	4^*	$(r_8, 4^*_z)$	1
	1	8	8^*	$(r_8, 8^*_z)$	1
2	8	1	2	(r_8, ϵ)	1
	4	2	4^*	$(r_8, 4^*_z)$	1
			2^*2^*2	$(r_8, 2^*_x)$	1
			$21'$	(r_8, ϵ')	1
	2	4	8^*	$(r_8, 8^*_z)$	1
	1	8	16^*	$(r_8, 16^*_z)$	2
$1'$	8	1	$1'$	(r_8, ϵ)	1
	4	2	$21'$	$(r_8, 2_{\bar{z}})$	1
	2	4	$41'$	$(r_8, 4_{\bar{z}})$	1
	1	8	$81'$	$(r_8, 8_{\bar{z}})$	1
$2'$	8	1	$2'$	(r_8, ϵ)	1
	4	2	$2'2^*2'^*$	$(r_8, 2^*_x)$	1
			$21'$	(r_8, ϵ')	1
	2	4	$41'$	$(r_8, 4^*_z)$	1
	1	8	$81'$	$(r_8, 8_{\bar{z}})$	1
$21'$	8	1	$21'$	(r_8, ϵ)	1
	4	2	$2'2'2'$	$(r_8, 2_{\bar{x}})$	1
			$41'$	$(r_8, 4_{\bar{z}})$	1
	2	4	$81'$	$(r_8, 8_{\bar{z}})$	1
	1	8	$161'$	$(r_8, 16_{\bar{z}})$	2
n	8	1	n	(r_8, ϵ)	5
	4	2	$(2n)^*$	$(r_8, 2n^*_z)$	9
			$n1'$	(r_8, ϵ')	5
	2	4	$(4n)^*$	$(r_8, 4n^*_z)$	7
	1	8	$(8n)^*$	$(r_8, 8n^*_z)$	6
n'	8	1	n'	(r_8, ϵ)	5
	4	2	$n1'$	(r_8, ϵ')	5
	2	4	$(2n)1'$	$(r_8, (2n)^*_z)$	9
	1	8	$(4n)1'$	$(r_8, (4n)^*_z)$	7
$n1'$	8	1	$n1'$	(r_8, ϵ)	5
	4	2	$(2n)1'$	$(r_8, 2n_{\bar{z}})$	9
	2	4	$(4n)1'$	$(r_8, 4n_{\bar{z}})$	7

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Table C-1: continued

Γ_e	G_ϵ	G/G_ϵ	Γ	generator	*line*
	1	8	$(8n)1'$	$(r_8, 8n_{\bar{z}})$	6
222	8	1	222	(r_8, ϵ)	3a
	4	2	$2'2'2'$	(r_8, ϵ')	3a
			$4^*2^\dagger 2^{*\dagger}$	$(r_8, 4^*_z)$	4
$2'2'2$	8	1	$2'2'2$	(r_8, ϵ)	3
	4	2	$2'2'2'$	(r_8, ϵ')	3
			$4^*2^\dagger 2^{*\dagger}$	$(r_8, 4^*_z)$	4
$2'2'2'$	8	1	$2'2'2'$	(r_8, ϵ)	3a
	4	2	$4221'$	$(r_8, 4_{\bar{z}})$	4

Table C-2: Explicit list of octagonal spin space-group types with $G = 8$ on S-lattices. The last column refers to line numbers in Table B-2, where the possible phase functions are listed, and rules are given to generate the spin space-group symbol.

Γ_e	G_ϵ	G/G_ϵ	Γ	generator	*line*
1	8	1	1	(r_8, ϵ)	1
	4	2	2^*	$(r_8, 2^*_z)$	1
			$1'$	(r_8, ϵ')	1
	2	4	4^*	$(r_8, 4^*_z)$	1
	1	8	8^*	$(r_8, 8^*_z)$	1
2	8	1	2	(r_8, ϵ)	1
	4	2	4^*	$(r_8, 4^*_z)$	1
			2^*2^*2	$(r_8, 2^*_x)$	1
			$21'$	(r_8, ϵ')	1
	2	4	8^*	$(r_8, 8^*_z)$	1
	1	8	16^*	$(r_8, 16^*_z)$	2
$1'$	8	1	$1'$	(r_8, ϵ)	1
	4	2	$21'$	$(r_8, 2_{\bar{z}})$	1
	2	4	$41'$	$(r_8, 4_{\bar{z}})$	1
	1	8	$81'$	$(r_8, 8_{\bar{z}})$	1
$2'$	8	1	$2'$	(r_8, ϵ)	1
	4	2	$2'2^*2'^*$	$(r_8, 2^*_x)$	1
			$21'$	(r_8, ϵ')	1
n	8	1	n	(r_8, ϵ)	4
	4	2	$(2n)^*$	$(r_8, 2n^*_z)$	8
			$n1'$	(r_8, ϵ')	4
			$n2^*2^*$	$(r_8, 2^*_x)$	4
	2	4	$(4n)^*$	$(r_8, 4n^*_z)$	6
	1	8	$(8n)^*$	$(r_8, 8n^*_z)$	5
n'	8	1	n'	(r_8, ϵ)	4
	4	2	$n1'$	(r_8, ϵ')	4
n'	8	1	$n1'$	(r_8, ϵ)	4
	4	2	$(2n)1'$	$(r_8, n_{\bar{z}})$	8
	2	4	$(4n)1'$	$(r_8, 4n_{\bar{z}})$	6
	1	8	$(8n)1'$	$(r_8, 8n_{\bar{z}})$	5
2^*2^*2	4	2	$4^*2^\dagger 2^{*\dagger}$	$(r_8, 4^*_z)$	3

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Table C-3: Explicit list of octagonal spin space-group types with $G = \bar{8}$ on V-lattices. The last column refers to line numbers in Table B-3, where the possible phase functions are listed, and rules are given to generate the spin space-group symbol.

Γ_e	G_ϵ	G/G_ϵ	Γ	generator	*line*
1	$\bar{8}$	1	1	$(\bar{r}_8, \epsilon)$	1
	4	2	2^*	$(\bar{r}_8, 2_z^*)$	1
			$1'$	$(\bar{r}_8, \epsilon')$	1
	2	4	4^*	$(\bar{r}_8, 4_z^*)$	1
	1	8	8^*	$(\bar{r}_8, 8_z^*)$	1
2	$\bar{8}$	1	2	$(\bar{r}_8, \epsilon)$	1
	4	2	4^*	$(\bar{r}_8, 4_z^*)$	1
			2^*2^*2	$(\bar{r}_8, 2_x^*)$	1
			$21'$	$(\bar{r}_8, \epsilon')$	1
	2	4	8^*	$(\bar{r}_8, 8_z^*)$	1
$2'$	$\bar{8}$	1	$2'$	$(\bar{r}_8, \epsilon)$	1
	4	2	$2'2^*2'^*$	$(\bar{r}_8, 2_x^*)$	1
			$21'$	$(\bar{r}_8, \epsilon')$	1
	2	4	$41'$	$(\bar{r}_8, 4_z^*)$	1
	1	8	$81'$	$(\bar{r}_8, 8_z^*)$	1
$1'$	$\bar{8}$	1	$1'$	$(\bar{r}_8, \epsilon)$	1
	4	2	$21'$	$(\bar{r}_8, 2_{\bar{z}})$	1
	2	4	$41'$	$(\bar{r}_8, 4_{\bar{z}})$	1
	1	8	$81'$	$(\bar{r}_8, 8_{\bar{z}})$	1
$21'$	$\bar{8}$	1	$21'$	$(\bar{r}_8, \epsilon)$	1
	4	2	$41'$	$(\bar{r}_8, 4_{\bar{z}})$	1
			$2'2'2'$	$(\bar{r}_8, 2_{\bar{x}})$	1
	2	4	$81'$	$(\bar{r}_8, 8_{\bar{z}})$	1
n	4	2	$n2^*2^*$	$(\bar{r}_8, 2_x^*)$	4
n'	4	2	$n'2^*n'^*$	$(\bar{r}_8, 2_x^*)$	4
$n1'$	4	2	$n221'$	$(\bar{r}_8, 2_{\bar{x}})$	4
222	$\bar{8}$	1	222	$(\bar{r}_8, \epsilon)$	$2a$
	4	2	$2'2'2'$	$(\bar{r}_8, \epsilon')$	$2a$
			$4^*2^\dagger2^{*\dagger}$	$(\bar{r}_8, 4_z^*)$	3
$2'2'2$	$\bar{8}$	1	$2'2'2$	$(\bar{r}_8, \epsilon)$	2
	4	2	$2'2'2'$	$(\bar{r}_8, \epsilon')$	2
			$4^*2^\dagger2^{*\dagger}$	$(\bar{r}_8, 4_z^*)$	3
$2'2'2'$	4	2	$4221'$	$(\bar{r}_8, 4_{\bar{z}})$	3

Table C-4: Explicit list of octagonal spin space-group types with $G = \bar{8}$ on S-lattices. The last column refers to line numbers in Table B-4, where the possible phase functions are listed, and rules are given to generate the spin space-group symbol.

Γ_e	G_ϵ	G/G_ϵ	Γ	generator	*line*
1	$\bar{8}$	1	1	$(\bar{r}_8, \epsilon)$	1
	4	2	2^*	$(\bar{r}_8, 2_z^*)$	1
			$1'$	$(\bar{r}_8, \epsilon')$	1
	2	4	4^*	$(\bar{r}_8, 4_z^*)$	1
	1	8	8^*	$(\bar{r}_8, 8_z^*)$	1
2	$\bar{8}$	1	2	$(\bar{r}_8, \epsilon)$	1
	4	2	4^*	$(\bar{r}_8, 4_z^*)$	1
			2^*2^*2	$(\bar{r}_8, 2_x^*)$	1
			$21'$	$(\bar{r}_8, \epsilon')$	1

continued on next page

Table C-4: continued

Γ_e	G_ϵ	G/G_ϵ	Γ	generator	*line*
	2	4	8^*	$(\bar{r}_8, 8_z^*)$	1
$2'$	$\bar{8}$	1	$2'$	$(\bar{r}_8, \epsilon)$	1
	4	2	$2'2^*2'^*$	$(\bar{r}_8, 2_x^*)$	1
			$21'$	$(\bar{r}_8, \epsilon')$	1
	2	4	$41'$	$(r_8, 4_z^*)$	1
	2	4	$41'$	$(r_8, 8_z^*)$	1
$1'$	$\bar{8}$	1	$1'$	$(\bar{r}_8, \epsilon)$	1
	4	2	$21'$	$(\bar{r}_8, 2_{\bar{z}})$	1
	2	4	$41'$	$(\bar{r}_8, 4_{\bar{z}})$	1
	1	8	$81'$	$(\bar{r}_8, 8_{\bar{z}})$	1
n	$\bar{8}$	1	n	$(\bar{r}_8, \epsilon)$	4
	4	2	$(2n)^*$	$(\bar{r}_8, 2n_z^*)$	4
			$n2^*2^*$	$(\bar{r}_8, 2_x^*)$	3
			$n1'$	$(\bar{r}_8, \epsilon')$	4
n'	$\bar{8}$	1	n'	$(\bar{r}_8, \epsilon)$	4
	4	2	$n'2^*n'^*$	$(\bar{r}_8, 2_x^*)$	3
2^*2^*2	4	2	$2'2'2'$	$(\bar{r}_8, \epsilon')$	2

Table C-5: Explicit list of octagonal spin space-group types with $G = 8mm$ on V-lattices. The last column refers to line numbers in Table B-5, where the possible phase functions are listed, and rules are given to generate the spin space-group symbol.

G_ϵ	G/G_ϵ	Γ	generators	*line*
$\Gamma_e = 1$				
$8mm$	1	1	$(r_8, \epsilon)(m, \epsilon)$	1
8	m	2	$(r_8, \epsilon)(m, 2_{\bar{z}})$	1
		$2'$	$(r_8, \epsilon)(m, 2'_{\bar{z}})$	1
		$1'$	$(r_8, \epsilon)(m, \epsilon')$	1
$4mm$	2	2^*	$(r_8, 2_z^*)(m, \epsilon)$	1
		$1'$	$(r_8, \epsilon')(m, \epsilon)$	1
$4m'm'$	2	2^*	$(r_8, 2_z^*)(m, 2_z^*)$	1
		$1'$	$(r_8, \epsilon')(m, \epsilon')$	1
4	$2mm$	$2^*2^\dagger2^{*\dagger}$	$(r_8, 2_z^*)(m, 2_x^\dagger)$	1
		$21'$	$(r_8, 2_z^*)(m, \epsilon')$	1
			$(r_8, \epsilon')(m, 2_z^*)$	1
			$(r_8, 2_z^*)(m, 2_z^{\prime *})$	1
2	$4mm$	$4^*2^\dagger2^{\dagger *}$	$(r_8, 4_z^*)(m, 2_x^\dagger)$	1
1	$8mm$	$8^*2^\dagger2^{*\dagger}$	$(r_8, 8_z^*)(m, 2_x^\dagger)$	1
			$(r_8, 8^{3*})(m, 2_x^\dagger)$	1
$\Gamma_e = 2$				
$8mm$	1	2	$(r_8, \epsilon)(m, \epsilon)$	1
8	m	2^*2^*2	$(r_8, \epsilon)(m, 2_x^*)$	1
		$21'$	$(r_8, \epsilon)(m, \epsilon')$	1
		4^*	$(r_8, \epsilon)(m, 4_z^*)$	2
$4mm$	2	2^*2^*2	$(r_8, 2_x^*)(m, \epsilon)$	1
		$21'$	$(r_8, \epsilon')(m, \epsilon)$	1
		4^*	$(r_8, 4_z^*)(m, \epsilon)$	3
$4m'm'$	2	2^*2^*2	$(r_8, 2_x^*)(m, 2_x^*)$	1
		$21'$	$(r_8, \epsilon')(m, \epsilon')$	1

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Table C-5: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
		4^*	$(r_8, 4^*_z)(m, 4^*_z)$	4
4	$2mm$	$4^*2^\dagger 2^{*\dagger}$	$(r_8, 4^*_z)(m, 2^\dagger_x)$	1
			$(r_8, 2^\dagger_x)(m, 4^*_z)$	4
			$(r_8, 2^\dagger_x)(m, 2^{*\dagger}_{xy})$	3
		$41'$	$(r_8, 4^*_z)(m, \epsilon')$	3
			$(r_8, \epsilon')(m, 4^*_z)$	2
			$(r_8, 4^*_z)(m, 4'^*_z)$	4
		$2'2'2'$	$(r_8, 2^*_x)(m, \epsilon')$	1
			$(r_8, \epsilon')(m, 2^*_x)$	1
			$(r_8, 2^*_x)(m, 2'^*_x)$	1
2	$4mm$	$8^*2^\dagger 2^{*\dagger}$	$(r_8, 8^*_z)(m, 2^\dagger_x)$	1
$\Gamma_e = 2'$				
$8mm$	1	$2'$	$(r_8, \epsilon)(m, \epsilon)$	1
8	m	$2'2^*2'^*$	$(r_8, \epsilon)(m, 2^*_x)$	1
		$21'$	$(r_8, \epsilon)(m, \epsilon')$	1
$4mm$	2	$2'2^*2'^*$	$(r_8, 2^*_x)(m, \epsilon)$	1
		$21'$	$(r_8, \epsilon')(m, \epsilon)$	1
$4m'm'$	2	$2'2^*2'^*$	$(r_8, 2^*_x)(m, 2^*_x)$	1
		$21'$	$(r_8, \epsilon')(m, \epsilon')$	1
4	$2mm$	$2'2'2'$	$(r_8, 2^*_x)(m, \epsilon')$	1
			$(r_8, \epsilon')(m, 2^*_x)$	1
			$(r_8, 2^*_x)(m, 2'^*_x)$	1
2	$4mm$	$4221'$	$(r_8, 4^*_z)(m, 2^\dagger_x)$	1
1	$8mm$	$8221'$	$(r_8, 8^*_z)(m, 2^\dagger_x)$	1
$\Gamma_e = 1'$				
$8mm$	1	$1'$	$(r_8, \epsilon)(m, \epsilon)$	1
8	m	$21'$	$(r_8, \epsilon)(m, 2^-_z)$	1
$4mm$	2	$21'$	$(r_8, 2^-_z)(m, \epsilon)$	1
$4m'm'$	2	$21'$	$(r_8, 2^-_z)(m, 2^-_z)$	1
4	$2mm$	$2'2'2'$	$(r_8, 2^-_z)(m, 2^-_x)$	1
2	$4mm$	$4221'$	$(r_8, 4^-_z)(m, 2^-_x)$	1
1	$8mm$	$8221'$	$(r_8, 8^-_z)(m, 2^-_x)$	1
			$(r_8, 8^{3*})(m, 2^\dagger_x)$	1
$\Gamma_e = 21'$				
$8mm$	1	$21'$	$(r_8, \epsilon)(m, \epsilon)$	1
8	m	$41'$	$(r_8, \epsilon)(m, 4^-_z)$	2
		$2'2'2'$	$(r_8, \epsilon)(m, 2^-_x)$	1
$4mm$	2	$41'$	$(r_8, 4^-_z)(m, \epsilon)$	3
		$2'2'2'$	$(r_8, 2^-_x)(m, \epsilon)$	1
$4m'm'$	2	$41'$	$(r_8, 4^-_z)(m, 4^-_z)$	4
		$2'2'2'$	$(r_8, 2^-_x)(m, 2^-_x)$	1
4	$2mm$	$4221'$	$(r_8, 4^-_z)(m, 2^-_x)$	1
			$(r_8, 2^-_x)(m, 4^-_z)$	4
			$(r_8, 2^-_x)(m, 2^-_{xy})$	3
2	$4mm$	$8221'$	$(r_8, 8^-_z)(m, 2^-_x)$	1
$\Gamma_e = n$				
$8mm$	1	n	$(r_8, \epsilon)(m, \epsilon)$	7
8	2	$(2n)^*$	$(r_8, \epsilon)(m, (2n)^*_z)$	8
		$n1'$	$(r_8, \epsilon)(m, \epsilon')$	7
$4mm$	2	$(2n)^*$	$(r_8, (2n)^*_z)(m, \epsilon)$	9

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Table C-5: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
		$n1'$	$(r_8, \epsilon')(m, \epsilon)$	7
$4m'm'$	2	$(2n)^*$	$(r_8, (2n)^{*}_{\bar z})(m, (2n)^{*}_{\bar z})$	10
		$n1'$	$(r_8, \epsilon')(m, \epsilon')$	7
4	$2mm$	$(2n)1'$	$(r_8, (2n)^{*}_{\bar z})(m, \epsilon')$	9
			$(r_8, \epsilon')(m, (2n)^{*}_{\bar z})$	8
			$(r_8, (2n)^{*}_{\bar z})(m, (2n)^{\prime *}_{\bar z})$	10
$\Gamma_e = n'$				
$8mm$	1	n'	$(r_8, \epsilon)(m, \epsilon)$	7
8	m	$n1'$	$(r_8, \epsilon)(m, \epsilon')$	7
$4mm$	2	$n1'$	$(r_8, \epsilon')(m, \epsilon)$	7
$4m'm'$	2	$n1'$	$(r_8, \epsilon')(m, \epsilon')$	7
$\Gamma_e = n1'$ or n'				
$8mm$	1	$n1'$	$(r_8, \epsilon)(m, \epsilon)$	7
8	m	$(2n)1'$	$(r_8, \epsilon)(m, (2n)_{\bar z})$	8
$4mm$	2	$(2n)1'$	$(r_8, (2n)_{\bar z})(m, \epsilon)$	9
$4m'm'$	2	$(2n)1'$	$(r_8, (2n)^{*}_{\bar z})(m, (2n)^{*}_{\bar z})$	10
$\Gamma_e = 222$				
$8mm$	1	222	$(r_8, \epsilon)(m, \epsilon)$	$5a$
8	m	$2'2'2'$	$(r_8, \epsilon)(m, \epsilon')$	$5a$
$4mm$	2	$2'2'2'$	$(r_8, \epsilon')(m, \epsilon)$	$5a$
		4^*22^*	$(r_8, 4^{*}_{\bar z})(m, \epsilon)$	6
$4m'm'$	2	$2'2'2'$	$(r_8, \epsilon')(m, \epsilon')$	$5a$
4	$2mm$	$4221'$	$(r_8, 4^{*}_{\bar z})(m, \epsilon')$	6
$\Gamma_e = 2'2'2$				
$8mm$	1	$2'2'2$	$(r_8, \epsilon)(m, \epsilon)$	5
8	m	$2'2'2'$	$(r_8, \epsilon)(m, \epsilon')$	5
$4mm$	2	$2'2'2'$	$(r_8, \epsilon')(m, \epsilon)$	5
		4^*22^*	$(r_8, 4^{*}_{\bar z})(m, \epsilon)$	6
$4m'm'$	2	$2'2'2'$	$(r_8, \epsilon')(m, \epsilon')$	5
4	$2mm$	$4221'$	$(r_8, 4^{*}_{\bar z})(m, \epsilon')$	6
$\Gamma_e = 2'2'2'$				
$4mm$	2	$4221'$	$(r_8, 4_{\bar z})(m, \epsilon)$	6

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Table C-6: Explicit list of octagonal spin space-group types with $G = 8mm$ on S-lattices. The last column refers to line numbers in Table B-6, where the possible phase functions are listed, and rules are given to generate the spin space-group symbol.

G_ϵ	G/G_ϵ	Γ	generators	*line*
$\Gamma_e = 1$				
$8mm$	1	1	$(r_8, \epsilon)(m, \epsilon)$	1
8	m	2	$(r_8, \epsilon)(m, 2_{\bar{z}})$	1
		$2'$	$(r_8, \epsilon)(m, 2'_{\bar{z}})$	1
		$1'$	$(r_8, \epsilon)(m, \epsilon')$	1
$4mm$	2	2^*	$(r_8, 2_z^*)(m, \epsilon)$	1
		$1'$	$(r_8, \epsilon')(m, \epsilon)$	1
$4m'm'$	2	2^*	$(r_8, 2_z^*)(m, 2_z^*)$	1
		$1'$	$(r_8, \epsilon')(m, \epsilon')$	1
4	$2mm$	$2^*2^\dagger2^{*\dagger}$	$(r_8, 2_z^*)(m, 2_x^\dagger)$	1
		$21'$	$(r_8, 2_z^*)(m, \epsilon')$	1
			$(r_8, \epsilon')(m, 2_z^*)$	1
			$(r_8, 2_z^*)(m, 2_z^{\prime *})$	1
2	$4mm$	$4^*2^\dagger2^{\dagger *}$	$(r_8, 4_z^*)(m, 2_x^\dagger)$	1
1	$8mm$	$8^*2^\dagger2^{*\dagger}$	$(r_8, 8_z^*)(m, 2_x^\dagger)$	1
			$(r_8, 8^{3*})(m, 2_x^\dagger)$	1
$\Gamma_e = 2$				
$8mm$	1	2	$(r_8, \epsilon)(m, \epsilon)$	1
8	m	2^*2^*2	$(r_8, \epsilon)(m, 2_x^*)$	1
		$21'$	$(r_8, \epsilon)(m, \epsilon')$	1
		4^*	$(r_8, \epsilon)(m, 4_z^*)$	2
$4mm$	2	2^*2^*2	$(r_8, 2_x^*)(m, \epsilon)$	1
		$21'$	$(r_8, \epsilon')(m, \epsilon)$	1
		4^*	$(r_8, 4_z^*)(m, \epsilon)$	3
$4m'm'$	2	2^*2^*2	$(r_8, 2_x^*)(m, 2_x^*)$	1
		$21'$	$(r_8, \epsilon')(m, \epsilon')$	1
		4^*	$(r_8, 4_z^*)(m, 4_z^*)$	4
4	$2mm$	$4^*2^\dagger2^{*\dagger}$	$(r_8, 4_z^*)(m, 2_x^\dagger)$	1
			$(r_8, 2_x^\dagger)(m, 4_z^*)$	2
			$(r_8, 2_x^\dagger)(m, 2_{xy}^{*\dagger})$	3
		$41'$	$(r_8, 4_z^*)(m, \epsilon')$	3
			$(r_8, \epsilon')(m, 4_z^*)$	2
			$(r_8, 4_z^*)(m, 4_z^{\prime *})$	4
		$2'2'2'$	$(r_8, 2_x^*)(m, \epsilon')$	1
			$(r_8, \epsilon')(m, 2_x^*)$	1
			$(r_8, 2_x^*)(m, 2_x^{\prime *})$	1
2	$4mm$	$8^*2^\dagger2^{*\dagger}$	$(r_8, 8_z^*)(m, 2_x^\dagger)$	1
$\Gamma_e = 2'$				
$8mm$	1	$2'$	$(r_8, \epsilon)(m, \epsilon)$	1
8	m	$2'2^*2'^*$	$(r_8, \epsilon)(m, 2_x^*)$	1
		$21'$	$(r_8, \epsilon)(m, \epsilon')$	1
$4mm$	2	$2'2^*2'^*$	$(r_8, 2_x^*)(m, \epsilon)$	1
		$21'$	$(r_8, \epsilon')(m, \epsilon)$	1
$4m'm'$	2	$2'2^*2'^*$	$(r_8, 2_x^*)(m, 2_x^*)$	1
		$21'$	$(r_8, \epsilon')(m, \epsilon')$	1
4	$2mm$	$2'2'2'$	$(r_8, 2_x^*)(m, \epsilon')$	1
			$(r_8, \epsilon')(m, 2_x^*)$	1
			$(r_8, 2_x^*)(m, 2_x^{\prime *})$	1

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Table C-6: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
2	$4mm$	$4221'$	$(r_8, 4_{\frac{*}{z}})(m, 2_{\frac{\dagger}{x}})$	1
1	$8mm$	$8221'$	$(r_8, 8_{\frac{*}{z}})(m, 2_{\frac{\dagger}{x}})$	1
$\Gamma_e = 1'$				
$8mm$	1	$1'$	$(r_8, \epsilon)(m, \epsilon)$	1
8	m	$21'$	$(r_8, \epsilon)(m, 2_{\frac{}{z}})$	1
$4mm$	2	$21'$	$(r_8, 2_{\frac{}{z}})(m, \epsilon)$	1
$4m'm'$	2	$21'$	$(r_8, 2_{\frac{}{z}})(m, 2_{\frac{}{z}})$	1
4	$2mm$	$2'2'2'$	$(r_8, 2_{\frac{}{z}})(m, 2_{\frac{}{x}})$	1
2	$4mm$	$4221'$	$(r_8, 4_{\frac{}{z}})(m, 2_{\frac{}{x}})$	1
1	$8mm$	$8221'$	$(r_8, 8_{\frac{}{z}})(m, 2_{\frac{}{x}})$	1
			$(r_8, 8^{3*})(m, 2_{\frac{\dagger}{x}})$	1
$\Gamma_e = n$				
$8mm$	1	n	$(r_8, \epsilon)(m, \epsilon)$	6
8	2	$(2n)^*$	$(r_8, \epsilon)(m, (2n)_{\frac{*}{z}})$	7
		$n1'$	$(r_8, \epsilon)(m, \epsilon')$	6
$4mm$	2	$(2n)^*$	$(r_8, (2n)_{\frac{*}{z}})(m, \epsilon)$	8
		$n1'$	$(r_8, \epsilon')(m, \epsilon)$	6
$4m'm'$	2	$(2n)^*$	$(r_8, (2n)_{\frac{*}{z}})(m, (2n)_{\frac{*}{z}})$	9
		$n2^*2^*$	$(r_8, 2_{\frac{*}{x}})(m2_{\frac{*}{x}})$	10
		$n1'$	$(r_8, \epsilon')(m, \epsilon')$	6
4	222	$(2n)^*2^\dagger 2^{*\dagger}$	$(r_8, (2n)_{\frac{}{z}} 2_{\frac{*}{x}}^{\dagger})(m, 2_{\frac{\dagger}{x}})$	11
		$n221'$	$(r_8, 2_{\frac{*}{x}})(m, 2_{\frac{\prime *}{x}})$	10
		$(2n)1'$	$(r_8, (2n)_{\frac{*}{z}})(m, \epsilon')$	8
			$(r_8, \epsilon')(m, (2n)_{\frac{*}{z}})$	7
			$(r_8, (2n)_{\frac{*}{z}})(m, (2n)_{\frac{\prime *}{z}})$	9
$\Gamma_e = n'$				
$8mm$	1	n'	$(r_8, \epsilon)(m, \epsilon)$	6
8	m	$n1'$	$(r_8, \epsilon)(m, \epsilon')$	6
$4mm$	2	$n1'$	$(r_8, \epsilon')(m, \epsilon)$	6
$4m'm'$	2	$n'2^*2'^*$	$(r_8, 2_{\frac{*}{x}})(m, 2_{\frac{*}{x}})$	10
		$n1'$	$(r_8, \epsilon')(m, \epsilon')$	6
4	222	$n221'$	$(r_8, 2_{\frac{*}{x}})(m, 2_{\frac{\prime *}{x}})$	10
$\Gamma_e = 2^*2^*2$				
$4m'm'$	2	$4^\dagger 2^* 2^{*\dagger}$	$(r_8, 4_{\frac{\dagger}{z}})(m, 4_{\frac{\dagger}{z}})$	5
4	$2mm$	$4221'$	$(r_8, 4_{\frac{\dagger}{z}})(m, 4_{\frac{\dagger}{z}}^{\prime})$	5

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Table C-7: Explicit list of octagonal spin space-group types with $G = \bar{8}m2$ on V-lattices. The last column refers to line numbers in Table B-7, where the possible phase functions are listed, and rules are given to generate the spin space-group symbol.

G_ϵ	G/G_ϵ	Γ	generators	*line*
$\Gamma_e = 1$				
$\bar{8}m2$	1	1	$(\bar{r}_8, \epsilon)(m, \epsilon)$	1
$\bar{8}$	2	2^*	$(\bar{r}_8, \epsilon)(m, 2_z^*)$	1
		$1'$	$(\bar{r}_8, \epsilon)(m, \epsilon')$	1
$4mm$	2	2^*	$(\bar{r}_8, 2_z^*)(m, \epsilon)$	1
		$1'$	$(\bar{r}_8, \epsilon')(m, \epsilon)$	1
$42'2'$	2	2^*	$(\bar{r}_8, 2_z^*)(m, 2_z^*)$	1
		$1'$	$(\bar{r}_8, \epsilon')(m, \epsilon')$	1
4	222	$2^*2^\dagger2^{*\dagger}$	$(\bar{r}_8, 2_z^*)(m, 2_x^\dagger)$	1
		$21'$	$(\bar{r}_8, 2_z^*)(m, \epsilon')$	1
			$(\bar{r}_8, \epsilon')(m, 2_z^*)$	1
			$(\bar{r}_8, 2_z^*)(m, 2_z^{\prime *})$	1
2	422	$4^*2^\dagger2^{\dagger *}$	$(\bar{r}_8, 4_z^*)(m, 2_x^\dagger)$	1
1	$8m2$	$8^*2^\dagger2^{*\dagger}$	$(\bar{r}_8, 8_z^*)(m, 2_x^\dagger)$	1
			$(\bar{r}_8, 8_z^{3*})(m, 2_x^\dagger)$	1
$\Gamma_e = 2$				
$\bar{8}m2$	1	2	$(\bar{r}_8, \epsilon)(m, \epsilon)$	1
$\bar{8}$	2	2^*2^*2	$(\bar{r}_8, \epsilon)(m, 2_x^*)$	1
		$21'$	$(\bar{r}_8, \epsilon)(m, \epsilon')$	1
$4mm$	2	2^*2^*2	$(\bar{r}_8, 2_x^*)(m, \epsilon)$	1
		$21'$	$(\bar{r}_8, \epsilon')(m, \epsilon)$	1
		4^*	$(\bar{r}_8, 4_z^*)(m, \epsilon)$	2
$42'2'$	2	2^*2^*2	$(\bar{r}_8, 2_x^*)(m, 2_x^*)$	1
		$21'$	$(\bar{r}_8, \epsilon')(m, \epsilon')$	1
		4^*	$(\bar{r}_8, 4_z^*)(m, 4_z^*)$	3
4	222	$4^*2^\dagger2^{*\dagger}$	$(\bar{r}_8, 4_z^*)(m, 2_x^\dagger)$	1
			$(\bar{r}_8, 2_x^\dagger)(m, 4_z^*)$	3
			$(\bar{r}_8, 2_x^\dagger)(m, 2_{xy}^{*\dagger})$	2
		$41'$	$(\bar{r}_8, 4_z^*)(m, \epsilon')$	2
			$(\bar{r}_8, 4_z^*)(m, 4_z^{\prime *})$	3
		$2'2'2'$	$(\bar{r}_8, 2_x^*)(m, \epsilon')$	1
			$(\bar{r}_8, \epsilon')(m, 2_x^*)$	1
			$(\bar{r}_8, 2_x^*)(m, 2_x^{\prime *})$	1
2	422	$8^*2^\dagger2^{*\dagger}$	$(\bar{r}_8, 8_z^*)(m, 2_x^\dagger)$	1
$\Gamma_e = 2'$				
$\bar{8}m2$	1	$2'$	$(\bar{r}_8, \epsilon)(m, \epsilon)$	1
$\bar{8}$	2	$2'2^*2'^*$	$(\bar{r}_8, \epsilon)(m, 2_x^*)$	1
		$21'$	$(\bar{r}_8, \epsilon)(m, \epsilon')$	1
$4mm$	2	$2'2^*2'^*$	$(\bar{r}_8, 2_x^*)(m, \epsilon)$	1
		$21'$	$(\bar{r}_8, \epsilon')(m, \epsilon)$	1
$42'2'$	2	$2'2^*2'^*$	$(\bar{r}_8, 2_x^*)(m, 2_x^*)$	1
		$21'$	$(\bar{r}_8, \epsilon')(m, \epsilon')$	1
4	222	$2'2'2'$	$(\bar{r}_8, 2_x^*)(m, \epsilon')$	1
			$(\bar{r}_8, \epsilon')(m, 2_x^*)$	1
			$(\bar{r}_8, 2_x^*)(m, 2_x^{\prime *})$	1
2	422	$4221'$	$(\bar{r}_8, 4_z^*)(m, 2_x^\dagger)$	1
1	$\bar{8}m2$	$8221'$	$(\bar{r}_8, 8_z^*)(m, 2_x^\dagger)$	1
$\Gamma_e = 1'$				

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Table C-7: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
$\bar{8}m2$	1	$1'$	$(\bar{r}_8, \epsilon)(m, \epsilon)$	1
$\bar{8}$	2	$21'$	$(\bar{r}_8, \epsilon)(m, 2_{\bar{z}})$	1
$4mm$	2	$21'$	$(\bar{r}_8, 2_{\bar{z}})(m, \epsilon)$	1
$42'2'$	2	$21'$	$(\bar{r}_8, 2_{\bar{z}})(m, 2_{\bar{z}})$	1
4	222	$2'2'2'$	$(\bar{r}_8, 2_{\bar{z}})(m, 2_{\bar{x}})$	1
2	$\bar{4}22$	$4221'$	$(\bar{r}_8, 4_{\bar{z}})(m, 2_{\bar{x}})$	1
1	$\bar{8}m2$	$8221'$	$(\bar{r}_8, 8_{\bar{z}})(m, 2_{\bar{x}})$	1
			$(\bar{r}_8, 8^{3}_{\bar{z}})(m, 2_{\bar{x}})$	1
$\Gamma_e = 21'$				
$\bar{8}m2$	1	$21'$	$(\bar{r}_8, \epsilon)(m, \epsilon)$	1
$\bar{8}$	2	$2'2'2'$	$(\bar{r}_8, \epsilon)(m, 2_{\bar{x}})$	1
$4mm$	2	$41'$	$(\bar{r}_8, 4_{\bar{z}})(m, \epsilon)$	1
		$2'2'2'$	$(\bar{r}_8, 2_{\bar{x}})(m, \epsilon)$	1
$42'2'$	2	$41'$	$(\bar{r}_8, 4_{\bar{z}})(m, 4_{\bar{z}})$	3
		$2'2'2'$	$(\bar{r}_8, 2_{\bar{x}})(m, 2_{\bar{x}})$	1
4	222	$4221'$	$(\bar{r}_8, 4_{\bar{z}})(m, 2_{\bar{x}})$	1
			$(\bar{r}_8, 2_{\bar{x}})(m, 4_{\bar{z}})$	3
			$(\bar{r}_8, 2_{\bar{x}})(m, 2_{\overline{xy}})$	2
2	422	$8221'$	$(\bar{r}_8, 8_{\bar{z}})(m, 2_{\bar{x}})$	1
$\Gamma_e = n$				
$4mm$	2	$n2^*2^*$	$(\bar{r}_8, 2^{*}_{\bar{x}})(m, \epsilon)$	6
4	222	$(2n)^*2^\dagger 2^{*\dagger}$	$(\bar{r}_8, 2^{\dagger}_{\bar{x}})(m, (2n)^{*}_{\bar{z}})$	7
		$n221'$	$(\bar{r}_8, 2^{*}_{\bar{x}})(m, \epsilon')$	6
$\Gamma_e = n'$				
$4mm$	2	$n'2^*2'^*$	$(\bar{r}_8, 2^{*}_{\bar{x}})(m, \epsilon)$	6
4	222	$n221'$	$(\bar{r}_8, 2^{*}_{\bar{x}})(m, \epsilon')$	6
$\Gamma_e = n1'$				
$4mm$	2	$n221'$	$(\bar{r}_8, 2_{\bar{x}})(m, \epsilon)$	6
4	222	$(2n)221'$	$(\bar{r}_8, 2_{\bar{x}})(m, (2n)_{\bar{z}})$	7
$\Gamma_e = 222$				
$\bar{8}m2$	1	222	$(\bar{r}_8, \epsilon)(m, \epsilon)$	4*a*
$\bar{8}$	2	$2'2'2'$	$(\bar{r}_8, \epsilon)(m, \epsilon')$	4*a*
$4mm$	2	$2'2'2'$	$(\bar{r}_8, \epsilon')(m, \epsilon)$	4*a*
		$4^\dagger 2^* 2^{*\dagger}$	$(\bar{r}_8, 4^{\dagger}_{\bar{z}})(m, \epsilon)$	5
$42'2'$	2	$2'2'2'$	$(\bar{r}_8, \epsilon')(m, \epsilon')$	4*a*
4	222	$4221'$	$(\bar{r}_8, 4^{\dagger}_{\bar{z}})(m, \epsilon')$	5
$\Gamma_e = 2'2'2$				
$\bar{8}m2$	1	2^*2^*2	$(\bar{r}_8, \epsilon)(m, \epsilon)$	4
$\bar{8}$	2	$2'2'2'$	$(\bar{r}_8, \epsilon)(m, \epsilon')$	4
$4mm$	2	$2'2'2'$	$(\bar{r}_8, \epsilon')(m, \epsilon)$	4
		$4^\dagger 2^* 2^{*\dagger}$	$(\bar{r}_8, 4^{\dagger}_{\bar{z}})(m, \epsilon)$	5
$42'2'$	2	$2'2'2'$	$(\bar{r}_8, \epsilon')(m, \epsilon')$	4
4	222	$4221'$	$(\bar{r}_8, 4^{\dagger}_{\bar{z}})(m, \epsilon')$	5
$\Gamma_e = 2'2'2'$				
$4mm$	2	$4221'$	$(\bar{r}_8, 4_{\bar{z}})(m, \epsilon)$	5

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Table C-8: Explicit list of octagonal spin space-group types with $G = \bar{8}m2$ on *S*-lattices. The last column refers to line numbers in Table B-8, where the possible phase functions are listed, and rules are given to generate the spin space-group symbol.

G_ϵ	G/G_ϵ	Γ	generators	*line*
$\Gamma_e = 1$				
$\bar{8}m2$	1	1	$(\bar{r}_8, \epsilon)(m, \epsilon)$	1
$\bar{8}$	2	2^*	$(\bar{r}_8, \epsilon)(m, 2_z^*)$	1
		$1'$	$(\bar{r}_8, \epsilon)(m, \epsilon')$	1
$4mm$	2	2^*	$(\bar{r}_8, 2_z^*)(m, \epsilon)$	1
		$1'$	$(\bar{r}_8, \epsilon')(m, \epsilon)$	1
$42'2'$	2	2^*	$(\bar{r}_8, 2_z^*)(m, 2_z^*)$	1
		$1'$	$(\bar{r}_8, \epsilon')(m, \epsilon')$	1
4	222	$2^*2^\dagger 2^{*\dagger}$	$(\bar{r}_8, 2_z^*)(m, 2_x^\dagger)$	1
		$21'$	$(\bar{r}_8, 2_z^*)(m, \epsilon')$	1
			$(\bar{r}_8, \epsilon')(m, 2_z^*)$	1
			$(\bar{r}_8, 2_z^*)(m, 2_z^{\prime *})$	1
2	422	$4^*2^\dagger 2^{\dagger *}$	$(\bar{r}_8, 4_z^*)(m, 2_x^\dagger)$	1
1	$8m2$	$8^*2^\dagger 2^{*\dagger}$	$(\bar{r}_8, 8_z^*)(m, 2_x^\dagger)$	1
			$(\bar{r}_8, 8_z^{3*})(m, 2_x^\dagger)$	1
$\Gamma_e = 2$				
$\bar{8}m2$	1	2	$(\bar{r}_8, \epsilon)(m, \epsilon)$	1
$\bar{8}$	2	2^*2^*2	$(\bar{r}_8, \epsilon)(m, 2_x^*)$	1
		$21'$	$(\bar{r}_8, \epsilon)(m, \epsilon')$	1
$4mm$	2	2^*2^*2	$(\bar{r}_8, 2_x^*)(m, \epsilon)$	1
		$21'$	$(\bar{r}_8, \epsilon')(m, \epsilon)$	1
$42'2'$	2	2^*2^*2	$(\bar{r}_8, 2_x^*)(m, 2_x^*)$	1
		$21'$	$(\bar{r}_8, \epsilon')(m, \epsilon')$	1
		4^*	$(\bar{r}_8, 4_z^*)(m, 4_z^*)$	2
4	222	$4^*2^\dagger 2^{*\dagger}$	$(\bar{r}_8, 4_z^*)(m, 2_x^\dagger)$	1
			$(\bar{r}_8, 2_x^\dagger)(m, 4_z^*)$	2
		$41'$	$(\bar{r}_8, 4_z^*)(m, 4_z^{\prime *})$	2
		$2'2'2'$	$(\bar{r}_8, 2_x^*)(m, \epsilon')$	1
			$(\bar{r}_8, \epsilon')(m, 2_x^*)$	1
			$(\bar{r}_8, 2_x^*)(m, 2_x^{\prime *})$	1
2	422	$8^*2^\dagger 2^{*\dagger}$	$(\bar{r}_8, 8_z^*)(m, 2_x^\dagger)$	1
$\Gamma_e = 2'$				
$\bar{8}m2$	1	$2'$	$(\bar{r}_8, \epsilon)(m, \epsilon)$	1
$\bar{8}$	2	$2'2^*2'^*$	$(\bar{r}_8, \epsilon)(m, 2_z^*)$	1
		$21'$	$(\bar{r}_8, \epsilon)(m, \epsilon')$	1
$4mm$	2	$2'2^*2'^*$	$(\bar{r}_8, 2_x^*)(m, \epsilon)$	1
		$21'$	$(\bar{r}_8, \epsilon')(m, \epsilon)$	1
$42'2'$	2	$2'2^*2'^*$	$(\bar{r}_8, 2_x^*)(m, 2_x^*)$	1
		$21'$	$(\bar{r}_8, \epsilon')(m, \epsilon')$	1
4	222	$2'2'2'$	$(\bar{r}_8, 2_x^*)(m, \epsilon')$	1
			$(\bar{r}_8, \epsilon')(m, 2_x^*)$	1
			$(\bar{r}_8, 2_x^*)(m, 2_x^{\prime *})$	1
2	422	$4221'$	$(\bar{r}_8, 4_z^*)(m, 2_x^\dagger)$	1
1	$\bar{8}m2$	$8221'$	$(\bar{r}_8, 8_z^*)(m, 2_x^\dagger)$	1
$\Gamma_e = 1'$				
$\bar{8}m2$	1	$1'$	$(\bar{r}_8, \epsilon)(m, \epsilon)$	1
$\bar{8}$	2	$21'$	$(\bar{r}_8, \epsilon)(m, 2_z^-)$	1
$4mm$	2	$21'$	$(\bar{r}_8, 2_z^-)(m, \epsilon)$	1

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Table C-8: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
$42'2'$	2	$21'$	$(\bar{r}_8, 2_{\frac{}{z}})(m, 2_{\frac{}{z}})$	1
4	222	$2'2'2'$	$(\bar{r}_8, 2_{\frac{}{z}})(m, 2_{\frac{}{x}})$	1
2	422	$4221'$	$(\bar{r}_8, 4_{\frac{}{z}})(m, 2_{\frac{}{x}})$	1
1	$\bar{8}m2$	$8221'$	$(\bar{r}_8, 8_{\frac{}{z}})(m, 2_{\frac{}{x}})$	1
			$(\bar{r}_8, 8_{\frac{3}{z}})(m, 2_{\frac{}{x}})$	1
$\Gamma_e = n$				
$\bar{8}$	2	$n2^*2^*$	$(\bar{r}_8, \epsilon)(m, 2_{\frac{*}{x}})$	6
$4mm$	2	$(2n)^*n2^*2^*$	$(\bar{r}_8, 2_{\frac{*}{x}})(m, \epsilon)$	4
4	222	$(2n)^*2^\dagger 2^{*\dagger}$	$(\bar{r}_8, (2n)_{\frac{*}{z}})(m, 2_{\frac{\dagger}{x}})$	6
			$(\bar{r}_8, 2_{\frac{\dagger}{x}})(m, (2n)_{\frac{*}{z}})$	5
		$n221'$	$(\bar{r}_8, 2_{\frac{*}{x}})(m, \epsilon')$	4
			$(\bar{r}_8, \epsilon')(m, 2_{\frac{*}{x}})$	6
$\Gamma_e = n'$				
$\bar{8}$	2	$n'2^*2'^*$	$(\bar{r}_8, \epsilon)(m, 2_{\frac{*}{x}})$	6
$4mm$	2	$n'2^*2'^*$	$(\bar{r}_8, 2_{\frac{*}{x}})(m, \epsilon)$	4
4	222	$n221'$	$(\bar{r}_8, 2_{\frac{*}{x}})(m, \epsilon')$	4
			$(\bar{r}_8, \epsilon')(m, 2_{\frac{*}{x}})$	6
2	422	$(2n)221'$	$(\bar{r}_8, (2n)_{\frac{*}{z}})(m, 2_{\frac{\dagger}{x}})$	6
$\Gamma_e = 2^*2^*2$				
$42'2'$	2	$4^\dagger 2^* 2^{\dagger *}$	$(\bar{r}_8, 4_{\frac{\dagger}{z}})(m, 4_{\frac{\dagger}{z}})$	3
4	222	$4221'$	$(\bar{r}_8, 4_{\frac{\dagger}{z}})(m, 4_{\frac{\prime\dagger}{z}})$	3

Table C-9: Explicit list of octagonal spin space-group types with $G = 822$ on V-lattices. The last column refers to line numbers in Table B-9, where the possible phase functions are listed, and rules are given to generate the spin space-group symbol.

G_ϵ	G/G_ϵ	Γ	generators	*line*
$\Gamma_e = 1$				
822	1	1	$(r_8, \epsilon)(d, \epsilon)$	1
8	m	2^*	$(r_8, \epsilon)(d, 2_{\frac{*}{z}})$	1
		$1'$	$(r_8, \epsilon)(d, \epsilon')$	1
422	2	2^*	$(r_8, 2_{\frac{*}{z}})(d, \epsilon)$	1
		$1'$	$(r_8, \epsilon')(d, \epsilon)$	1
$42'2'$	2	2^*	$(r_8, 2_{\frac{*}{z}})(d, 2_{\frac{*}{z}})$	1
		$1'$	$(r_8, \epsilon')(d, \epsilon')$	1
4	222	$2^*2^\dagger 2^{*\dagger}$	$(r_8, 2_{\frac{*}{z}})(d, 2_{\frac{\dagger}{x}})$	1
		$21'$	$(r_8, 2_{\frac{*}{z}})(d, \epsilon')$	1
			$(r_8, \epsilon')(d, 2_{\frac{*}{z}})$	1
			$(r_8, 2_{\frac{*}{z}})(d, 2_{\frac{\prime *}{z}})$	1
2	422	$4^*2^\dagger 2^{\dagger *}$	$(r_8, 4_{\frac{*}{z}})(d, 2_{\frac{\dagger}{x}})$	1
1	822	$8^*2^\dagger 2^{*\dagger}$	$(r_8, 8_{\frac{*}{z}})(d, 2_{\frac{\dagger}{x}})$	1
			$(r_8, 8_{\frac{3*}{z}})(d, 2_{\frac{\dagger}{x}})$	1
$\Gamma_e = 2$				
822	1	2	$(r_8, \epsilon)(d, \epsilon)$	1
8	m	2^*2^*2	$(r_8, \epsilon)(d, 2_{\frac{*}{x}})$	1
		$21'$	$(r_8, \epsilon)(d, \epsilon')$	1
422	2	2^*2^*2	$(r_8, 2_{\frac{*}{x}})(d, \epsilon)$	1
		$21'$	$(r_8, \epsilon')(d, \epsilon)$	1
		4^*	$(r_8, 4_{\frac{*}{z}})(d, \epsilon)$	3

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Table C-9: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
$42'2'$	2	2^*2^*2	$(r_8, 2_{\frac{*}{x}})(d, 2_{\frac{*}{x}})$	1
		$21'$	$(r_8, \epsilon')(d, \epsilon')$	1
4	222	$4^*2^\dagger 2^{*\dagger}$	$(r_8, 4_{\frac{*}{z}})(d, 2_{\frac{\dagger}{x}})$	1
			$(r_8, 2_{\frac{\dagger}{x}})(d, 2_{\frac{*\dagger}{xy}})$	3
		$41'$	$(r_8, 4_{\frac{*}{z}})(d, \epsilon')$	3
		$2'2'2'$	$(r_8, 2_{\frac{*}{x}})(d, \epsilon')$	1
			$(r_8, \epsilon')(d, 2_{\frac{*}{x}})$	1
			$(r_8, 2_{\frac{*}{x}})(d, 2_{\frac{\prime *}{x}})$	1
2	422	$8^*2^\dagger 2^{*\dagger}$	$(r_8, 8_{\frac{*}{z}})(d, 2_{\frac{\dagger}{x}})$	1
1	822	$(16)^*2^\dagger 2^{*\dagger}$	$(r_8, 16_{\frac{*}{z}})(d, 2_{\frac{\dagger}{x}})$	2
			$(r_8, 16^{3*})(d, 2_{\frac{\dagger}{x}})$	2
$\Gamma_e = 2'$				
822	1	$2'$	$(r_8, \epsilon)(d, \epsilon)$	1
8	*m*	$2'2^*2'^*$	$(r_8, \epsilon)(d, 2_{\frac{*}{x}})$	1
		$21'$	$(r_8, \epsilon)(d, \epsilon')$	1
422	2	$2'2^*2'^*$	$(r_8, 2_{\frac{*}{x}})(d, \epsilon)$	1
		$21'$	$(r_8, \epsilon')(d, \epsilon)$	1
$42'2'$	2	$2'2^*2'^*$	$(r_8, 2_{\frac{*}{x}})(d, 2_{\frac{*}{x}})$	1
		$21'$	$(r_8, \epsilon')(d, \epsilon')$	1
4	222	$2'2'2'$	$(r_8, 2_{\frac{*}{x}})(d, \epsilon')$	1
			$(r_8, \epsilon')(d, 2_{\frac{*}{x}})$	1
			$(r_8, 2_{\frac{*}{x}})(d, 2_{\frac{\prime *}{x}})$	1
2	422	$4221'$	$(r_8, 4_{\frac{*}{z}})(d, 2_{\frac{\dagger}{x}})$	1
1	822	$8221'$	$(r_8, 8_{\frac{*}{z}})(d, 2_{\frac{\dagger}{x}})$	1
$\Gamma_e = 1'$				
822	1	$1'$	$(r_8, \epsilon)(d, \epsilon)$	1
8	*m*	$21'$	$(r_8, \epsilon)(d, 2_{\frac{}{z}})$	1
422	2	$21'$	$(r_8, 2_{\frac{}{z}})(d, \epsilon)$	1
$42'2'$	2	$21'$	$(r_8, 2_{\frac{}{z}})(d, 2_{\frac{}{z}})$	1
4	222	$2'2'2'$	$(r_8, 2_{\frac{}{z}})(d, 2_{\frac{}{x}})$	1
2	422	$4221'$	$(r_8, 4_{\frac{}{z}})(d, 2_{\frac{}{x}})$	1
1	822	$8221'$	$(r_8, 8_{\frac{}{z}})(d, 2_{\frac{}{x}})$	1
			$(r_8, 8_{\frac{3}{z}})(d, 2_{\frac{}{x}})$	1
$\Gamma_e = 21'$				
822	1	$21'$	$(r_8, \epsilon)(d, \epsilon)$	1
8	*m*	$2'2'2'$	$(r_8, \epsilon)(d, 2_{\frac{}{x}})$	1
422	2	$41'$	$(r_8, 4_{\frac{}{z}})(d, \epsilon)$	3
		$2'2'2'$	$(r_8, 2_{\frac{}{x}})(d, \epsilon)$	1
$42'2'$	2	$2'2'2'$	$(r_8, 2_{\frac{}{x}})(d, 2_{\frac{}{x}})$	1
4	222	$4221'$	$(r_8, 4_{\frac{}{z}})(d, 2_{\frac{}{x}})$	1
			$(r_8, 2_{\frac{}{x}})(d, 2_{\frac{}{xy}})$	3
2	422	$8221'$	$(r_8, 8_{\frac{}{z}})(d, 2_{\frac{}{x}})$	1
1	822	$(16)221'$	$(r_8, 16_{\frac{}{z}})(d, 2_{\frac{}{x}})$	2
			$(r_8, 16_{\frac{3}{z}})(d, 2_{\frac{}{x}})$	2
$\Gamma_e = n$				
8	2	$n2^*2^*$	$(r_8, \epsilon)(d, 2_{\frac{*}{x}})$	6
4	222	$(2n)^*2^\dagger 2^{*\dagger}$	$(r_8, (2n)_{\frac{*}{z}})(d, 2_{\frac{\dagger}{x}})$	10
		$n221'$	$(r_8, \epsilon')(d, 2_{\frac{*}{x}})$	6
2	422	$(4n)^*2^\dagger 2^{*\dagger}$	$(r_8, (4n)_{\frac{}{z}})(d, 2_{\frac{\dagger}{x}})$	9
1	822	$(8n)^*2^\dagger 2^{*\dagger}$	$(r_8, (8n)_{\frac{*}{z}})(d, 2_{\frac{\dagger}{x}})$	7

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Table C-9: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
			$(r_8,(8n)^{3*}_{\bar{z}})(d,2^{\dagger}_{\bar{x}})$	8
$\Gamma_e = n'$				
8	m	$n'2^*2'^*$	$(r_8,\epsilon)(d,2^{*}_{\bar{x}})$	6
4	222	$n221'$	$(r_8,\epsilon')(d,2^{*}_{\bar{x}})$	6
2	422	$(2n)221'$	$(r_8,(2n)^{*}_{\bar{z}})(d,2^{\dagger}_{\bar{x}})$	10
1	822	$(4n)221'$	$(r_8,(4n)^{*}_{\bar{z}})(d,2^{\dagger}_{\bar{x}})$	9
$\Gamma_e = n1'$				
8	2	$n221'$	$(r_8,\epsilon)(d,2_{\bar{x}})$	6
4	222	$(2n)221'$	$(r_8,(2n)_{\bar{z}})(d,2_{\bar{x}})$	10
2	422	$(4n)221'$	$(r_8,(4n)_{\bar{z}})(d,2_{\bar{x}})$	9
1	822	$(8n)221'$	$(r_8,(8n)_{\bar{z}})(d,2_{\bar{x}})$	7
			$(r_8,(8n)^{3}_{\bar{z}})(d,2_{\bar{x}})$	8
$\Gamma_e = 222$				
822	1	222	$(r_8,\epsilon)(d,\epsilon)$	4*a*
8	m	$2'2'2'$	$(r_8,\epsilon)(d,\epsilon')$	4*a*
422	2	$2'2'2'$	$(r_8,\epsilon')(d,\epsilon)$	4*a*
		$4^{\dagger}2^*2^{*\dagger}$	$(r_8,4^{\dagger}_{\bar{z}})(d,\epsilon)$	5
$42'2'$	2	$2'2'2'$	$(r_8,\epsilon')(d,\epsilon')$	4*a*
4	222	$4221'$	$(r_8,4^{\dagger}_{\bar{z}})(d,\epsilon')$	5
$\Gamma_e = 2'2'2$				
822	1	$2'2'2$	$(r_8,\epsilon)(d,\epsilon)$	4
8	m	$2'2'2'$	$(r_8,\epsilon)(d,\epsilon')$	4
422	2	$2'2'2'$	$(r_8,\epsilon')(d,\epsilon)$	4
		$4^{\dagger}2^*2^{*\dagger}$	$(r_8,4^{\dagger}_{\bar{z}})(d,\epsilon)$	5
$42'2'$	2	$2'2'2'$	$(r_8,\epsilon')(d,\epsilon')$	4
4	222	$4221'$	$(r_8,4^{\dagger}_{\bar{z}})(d,\epsilon')$	5
$\Gamma_e = 2'2'2'$				
822	1	$2'2'2'$	$(r_8,\epsilon)(d,\epsilon)$	4*a*
422	2	$4221'$	$(r_8,4_{\bar{z}})(d,\epsilon)$	5

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Table C-10: Explicit list of octagonal spin space-group types with $G = 822$ on S-lattices. The last column refers to line numbers in Table B-10, where the possible phase functions are listed, and rules are given to generate the spin space-group symbol.

G_ϵ	G/G_ϵ	Γ	generators	*line*
$\Gamma_e = 1$				
822	1	1	$(r_8,\epsilon)(d,\epsilon)$	1
8	2	2^*	$(r_8,\epsilon)(d,2^*_z)$	1
		$1'$	$(r_8,\epsilon)(d,\epsilon')$	1
422	2	2^*	$(r_8,2^*_z)(d,\epsilon)$	1
		$1'$	$(r_8,\epsilon')(d,\epsilon)$	1
$42'2'$	2	2^*	$(r_8,2^*_z)(d,2^*_z)$	1
		$1'$	$(r_8,\epsilon')(d,\epsilon')$	1
4	222	$2^*2^\dagger2^{*\dagger}$	$(r_8,2^*_z)(d,2^\dagger_x)$	1
		$21'$	$(r_8,2^*_z)(d,\epsilon')$	1
			$(r_8,\epsilon')(d,2^*_z)$	1
			$(r_8,2^*_z)(d,2'^*_z)$	1
2	422	$4^*2^\dagger2^{\dagger*}$	$(r_8,4^*_z)(d,2^\dagger_x)$	1
1	822	$8^*2^\dagger2^{*\dagger}$	$(r_8,8^*_z)(d,2^\dagger_x)$	1
			$(r_8,8^{3*}_z)(d,2^\dagger_x)$	1
$\Gamma_e = 2$				
822	1	2	$(r_8,\epsilon)(d,\epsilon)$	1
8	2	2^*2^*2	$(r_8,\epsilon)(d,2^*_x)$	1
		$21'$	$(r_8,\epsilon)(d,\epsilon')$	1
422	2	2^*2^*2	$(r_8,2^*_x)(d,\epsilon)$	1
		$21'$	$(r_8,\epsilon')(d,\epsilon)$	1
$42'2'$	2	2^*2^*2	$(r_8,2^*_x)(d,2^*_x)$	1
		$21'$	$(r_8,\epsilon')(d,\epsilon')$	1
		4^*	$(r_8,4^*_z)(d,4^*_z)$	3
4	222	$4^*2^\dagger2^{*\dagger}$	$(r_8,4^*_z)(d,2^\dagger_x)$	1
			$(r_8,2^\dagger_x)(d,4^*_z)$	1
			$(r_8,4^*_z)(d,4'^*_z)$	1
		$2'2'2'$	$(r_8,2^*_x)(d,\epsilon')$	1
			$(r_8,\epsilon')(d,2^*_x)$	1
			$(r_8,2^*_x)(d,2'^*_x)$	1
2	422	$8^*2^\dagger2^{*\dagger}$	$(r_8,8^*_z)(d,2^\dagger_x)$	1
1	822	$(16)^*2^\dagger2^{*\dagger}$	$(r_8,16^*_z)(d,2^\dagger_x)$	2
			$(r_8,16^{3*})(d,2^\dagger_x)$	2
$\Gamma_e = 2'$				
822	1	$2'$	$(r_8,\epsilon)(d,\epsilon)$	1
8	2	$2'2^*2'^*$	$(r_8,\epsilon)(d,2^*_x)$	1
		$21'$	$(r_8,\epsilon)(d,\epsilon')$	1
422	2	$2'2^*2'^*$	$(r_8,2^*_x)(d,\epsilon)$	1
		$21'$	$(r_8,\epsilon')(d,\epsilon)$	1
$42'2'$	2	$2'2^*2'^*$	$(r_8,2^*_x)(d,2^*_x)$	1
		$21'$	$(r_8,\epsilon')(d,\epsilon')$	1
4	222	$2'2'2'$	$(r_8,2^*_x)(d,\epsilon')$	1
			$(r_8,\epsilon')(d,2^*_x)$	1
			$(r_8,2^*_x)(d,2'^*_x)$	1
2	422	$4221'$	$(r_8,4^*_z)(d,2^\dagger_x)$	1
1	822	$8221'$	$(r_8,8^*_z)(d,2^\dagger_x)$	1
$\Gamma_e = 1'$				
822	1	$1'$	$(r_8,\epsilon)(d,\epsilon)$	1

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Table C-10: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
8	2	$21'$	$(r_8, \epsilon)(d, 2_{\bar{z}})$	1
422	2	$21'$	$(r_8, 2_{\bar{z}})(d, \epsilon)$	1
$42'2'$	2	$21'$	$(r_8, 2_{\bar{z}})(d, 2_{\bar{z}})$	1
4	222	$2'2'2'$	$(r_8, 2_{\bar{z}})(d, 2_{\bar{x}})$	1
2	422	$4221'$	$(r_8, 4_{\bar{z}})(d, 2_{\bar{x}})$	1
1	822	$8221'$	$(r_8, 8_{\bar{z}})(d, 2_{\bar{x}})$	1
			$(r_8, 8_{\frac{3}{z}})(d, 2_{\bar{x}})$	1
$\Gamma_e = n$				
8	2	$n2^*2^*$	$(r_8, \epsilon)(d, 2_{\frac{*}{x}})$	5
422	2	$n2^*2^*$	$(r_8, 2_{\frac{*}{x}})(d, \epsilon)$	10
4	222	$(2n)^*2^\dagger 2^{*\dagger}$	$(r_8, (2n)_{\frac{*}{z}})(d, 2_{\frac{\dagger}{x}})$	9
		$n221'$	$(r_8, 2_{\frac{*}{x}})(d, \epsilon')$	10
			$(r_8, \epsilon')(d, 2_{\frac{*}{x}})$	5
2	422	$(4n)^*2^\dagger 2^{*\dagger}$	$(r_8, (4n)_{\bar{z}})(d, 2_{\frac{\dagger}{x}})$	7
1	822	$(8n)^*2^\dagger 2^{*\dagger}$	$(r_8, (8n)_{\frac{*}{z}})(d, 2_{\frac{\dagger}{x}})$	6
			$(r_8, (8n)_{\frac{3*}{z}})(d, 2_{\frac{\dagger}{x}})$	8
$\Gamma_e = n'$				
8	2	$n'2^*2'^*$	$(r_8, \epsilon)(d, 2_{\frac{*}{x}})$	5
422	2	$n'2^*2'^*$	$(r_8, 2_{\frac{*}{x}})(d, \epsilon)$	10
4	222	$n221'$	$(r_8, 2_{\frac{*}{x}})(d, \epsilon')$	10
			$(r_8, \epsilon')(d, 2_{\frac{*}{x}})$	5
2	422	$(2n)221'$	$(r_8, (2n)_{\frac{*}{z}})(d, 2_{\frac{\dagger}{x}})$	5
1	822	$(4n)221'$	$(r_8, (4n)_{\frac{*}{z}})(d, 2_{\frac{\dagger}{x}})$	5
$\Gamma_e = 2^*2^*2$				
$42'2'$	2	$4^\dagger 2^* 2^{\dagger *}$	$(r_8, 4_{\frac{\dagger}{z}})(d, 4_{\frac{\dagger}{z}})$	4
4	222	$4221'$	$(r_8, 4_{\frac{\dagger}{z}})(d, 4_{\frac{\prime\dagger}{z}})$	4

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Table C-11: Explicit list of octagonal spin space-group types with $G = \bar{8}2m$ on V-lattices. The last column refers to line numbers in Table B-11, where the possible phase functions are listed, and rules are given to generate the spin space-group symbol.

G_ϵ	G/G_ϵ	Γ	generators	*line*
$\Gamma_e = 1$				
$\bar{8}m2$	1	1	$(\bar{r}_8, \epsilon)(d, \epsilon)$	1
$\bar{8}$	2	2^*	$(\bar{r}_8, \epsilon)(d, 2^{*}_{\bar{z}})$	1
		$1'$	$(\bar{r}_8, \epsilon)(d, \epsilon')$	1
$4mm$	2	2^*	$(\bar{r}_8, 2^{*}_{\bar{z}})(d, \epsilon)$	1
		$1'$	$(\bar{r}_8, \epsilon')(d, \epsilon)$	1
$42'2'$	2	2^*	$(\bar{r}_8, 2^{*}_{\bar{z}})(d, 2^{*}_{\bar{z}})$	1
		$1'$	$(\bar{r}_8, \epsilon')(d, \epsilon')$	1
	222	$2^*2^\dagger2^{*\dagger}$	$(\bar{r}_8, 2^{*}_{\bar{z}})(d, 2^{\dagger}_{\bar{x}})$	1
		$21'$	$(\bar{r}_8, 2^{*}_{\bar{z}})(d, \epsilon')$	1
			$(\bar{r}_8, \epsilon')(d, 2^{*}_{\bar{z}})$	1
			$(\bar{r}_8, 2^{*}_{\bar{z}})(d, 2^{\prime *}_{\bar{z}})$	1
2	422	$4^*2^\dagger2^{\dagger *}$	$(\bar{r}_8, 4^{*}_{\bar{z}})(d, 2^{\dagger}_{\bar{x}})$	1
1	$\bar{8}m2$	$8^*2^\dagger2^{*\dagger}$	$(\bar{r}_8, 8^{*}_{\bar{z}})(d, 2^{\dagger}_{\bar{x}})$	1
			$(\bar{r}_8, 8^{3*}_{\bar{z}})(d, 2^{\dagger}_{\bar{x}})$	1
$\Gamma_e = 2$				
$\bar{8}2m$	1	2	$(\bar{r}_8, \epsilon)(d, \epsilon)$	1
$\bar{8}$	2	2^*2^*2	$(\bar{r}_8, \epsilon)(d, 2^{*}_{\bar{x}})$	1
		$21'$	$(\bar{r}_8, \epsilon)(d, \epsilon')$	1
422	2	2^*2^*2	$(\bar{r}_8, 2^{*}_{\bar{x}})(d, \epsilon)$	1
		$21'$	$(\bar{r}_8, \epsilon')(d, \epsilon)$	1
$4m'm'$	2	2^*2^*2	$(\bar{r}_8, 2^{*}_{\bar{x}})(d, 2^{*}_{\bar{x}})$	1
		$21'$	$(\bar{r}_8, \epsilon')(d, \epsilon')$	1
4	222	$4^*2^\dagger2^{*\dagger}$	$(\bar{r}_8, 4^*\bar{z})(d, 2^{\dagger}_{\bar{x}})$	1
			$(\bar{r}_8, 2^{\dagger}_{\bar{x}})(d, 2^{*\dagger}_{\overline{xy}})$	2
		$2'2'2'$	$(\bar{r}_8, 2^{*}_{\bar{x}})(d, \epsilon')$	1
			$(\bar{r}_8, \epsilon')(d, 2^{*}_{\bar{x}})$	1
			$(\bar{r}_8, 2^{*}_{\bar{x}})(d, 2^{*\prime}_{\bar{x}})$	1
		$41'$	$(\bar{r}_8, 4^{*}_{\bar{z}})(d, \epsilon')$	2
2	422	$8^*2^\dagger2^{*\dagger}$	$(\bar{r}_8, 8^{*}_{\bar{z}})(d, 2^{\dagger}_{\bar{x}})$	1
$\Gamma_e = 2'$				
$\bar{8}m2$	1	$2'$	$(\bar{r}_8, \epsilon)(d, \epsilon)$	1
$\bar{8}$	2	$2'2^*2'^*$	$(\bar{r}_8, \epsilon)(d, 2^{*}_{\bar{x}})$	1
		$21'$	$(\bar{r}_8, \epsilon)(d, \epsilon')$	1
$4mm$	2	$2'2^*2'^*$	$(\bar{r}_8, 2^{*}_{\bar{x}})(d, \epsilon)$	1
		$21'$	$(\bar{r}_8, \epsilon')(d, \epsilon)$	1
$42'2'$	2	$2'2^*2'^*$	$(\bar{r}_8, 2^{*}_{\bar{x}})(d, 2^{*}_{\bar{x}})$	1
		$21'$	$(\bar{r}_8, \epsilon')(d, \epsilon')$	1
4	222	$2'2'2'$	$(\bar{r}_8, 2^{*}_{\bar{x}})(d, \epsilon')$	1
			$(\bar{r}_8, \epsilon')(d, 2^{*}_{\bar{x}})$	1
			$(\bar{r}_8, 2^{*}_{\bar{x}})(d, 2^{\prime *}_{\bar{x}})$	1
2	422	$4221'$	$(\bar{r}_8, 4^{*}_{\bar{z}})(d, 2^{\dagger}_{\bar{x}})$	1
1	$\bar{8}m2$	$8221'$	$(\bar{r}_8, 8^{*}_{\bar{z}})(d, 2^{\dagger}_{\bar{x}})$	1
$\Gamma_e = 1'$				
$\bar{8}m2$	1	$1'$	$(\bar{r}_8, \epsilon)(d, \epsilon)$	1
$\bar{8}$	2	$21'$	$(\bar{r}_8, \epsilon)(d, 2_{\bar{z}})$	1
$4mm$	2	$21'$	$(\bar{r}_8, 2_{\bar{z}})(d, \epsilon)$	1
$42'2'$	2	$21'$	$(\bar{r}_8, 2_{\bar{z}})(d, 2_{\bar{z}})$	1

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Table C-11: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
4	222	$2'2'2'$	$(\bar{r}_8, 2_{\bar{z}})(d, 2_{\bar{x}})$	1
2	422	$4221'$	$(\bar{r}_8, 4_{\bar{z}})(d, 2_{\bar{x}})$	1
1	$\bar{8}m2$	$8221'$	$(\bar{r}_8, 8_{\bar{z}})(d, 2_{\bar{x}})$	1
			$(\bar{r}_8, 8^3_{\bar{z}})(d, 2_{\bar{x}})$	1
$\Gamma_e = 21'$				
$\bar{8}2m$	1	$21'$	$(\bar{r}_8, \epsilon)(d, \epsilon)$	1
$\bar{8}$	2	$2'2'2'$	$(\bar{r}_8, \epsilon)(d, 2_{\bar{x}})$	1
422	2	$41'$	$(\bar{r}_8, 4_{\bar{z}})(d, \epsilon)$	2
		$2'2'2'$	$(\bar{r}_8, 2_{\bar{x}})(d, \epsilon)$	1
$4m'm'$	2	$2'2'2'$	$(\bar{r}_8, 2_{\bar{x}})(d, 2_{\bar{x}})$	1
4	222	$4221'$	$(\bar{r}_8, 4_{\bar{z}})(d, 2_{\bar{x}})$	1
			$(\bar{r}_8, 2_{\bar{x}})(d, 2_{\bar{xy}})$	2
2	422	$8221'$	$(\bar{r}_8, 8_{\bar{z}})(d, 2_{\bar{x}})$	1
$\Gamma_e = n$				
$4m'm'$	2	$n2^*2^*$	$(\bar{r}_8, 2^*_{\bar{x}})(d, 2^*_{\bar{x}})$	5
4	222	$(2n)^*2^\dagger 2^{*\dagger}$	$(\bar{r}_8, 2^\dagger_{\bar{x}}(2n)^*_{\bar{z}})(d, 2^\dagger_{\bar{x}})$	6
		$n221'$	$(\bar{r}_8, 2^*_{\bar{x}})(d, 2^{*'}_{\bar{x}})$	5
$\Gamma_e = n'$				
$4m'm'$	2	$n'2^*2^{*'}$	$(\bar{r}_8, 2^*_{\bar{x}})(d, 2^*_{\bar{x}})$	5
4	222	$n221'$	$(\bar{r}_8, 2^*_{\bar{x}})(d, 2^{*'}_{\bar{x}})$	5
$\Gamma_e = n1'$				
$4m'm'$	2	$n221'$	$(\bar{r}_8, 2_{\bar{x}})(d, 2_{\bar{x}})$	5
4	222	$(2n)221'$	$(\bar{r}_8, 2_{\bar{x}}(2n)_{\bar{z}})(d, 2_{\bar{x}})$	6
$\Gamma_e = 222$				
$\bar{8}2m$	1	222	$(\bar{r}_8, eps)(d, \epsilon)$	$3a$
$\bar{8}$	2	$2'2'2'$	$(\bar{r}_8, \epsilon), (d, \epsilon')$	$3a$
422	2	$2'2'2'$	$(\bar{r}_8, \epsilon')(d, \epsilon)$	$3a$
		4^*22^*	$(\bar{r}_8, 4^*_{\bar{z}})(d, \epsilon)$	4
$4m'm'$	2	$2'2'2'$	$(\bar{r}_8, \epsilon')(d, \epsilon')$	$3a$
4	222	$42'2'2'$	$(\bar{r}_8, 4^*_{\bar{z}})(d, \epsilon')$	4
$\Gamma_e = 2'2'2$				
$\bar{8}2m$	1	$2'2'2$	$(\bar{r}_8, eps)(d, \epsilon)$	3
$\bar{8}$	2	$2'2'2'$	$(\bar{r}_8, \epsilon), (d, \epsilon')$	3
422	2	$2'2'2'$	$(\bar{r}_8, \epsilon')(d, \epsilon)$	3
		4^*22^*	$(\bar{r}_8, 4^*_{\bar{z}})(d, \epsilon)$	4
$4m'm'$	2	$2'2'2'$	$(\bar{r}_8, \epsilon')(d, \epsilon')$	3
4	222	$42'2'2'$	$(\bar{r}_8, 4^*_{\bar{z}})(d, \epsilon')$	4
$\Gamma_e = 2'2'2'$				
$\bar{8}2m$	1	$2'2'2'$	$(\bar{r}_8, \epsilon)(d, \epsilon)$	$3a$
422	2	$4221'$	$(\bar{r}_8, 4_{\bar{z}})(d, \epsilon)$	4

Table C-12: Explicit list of octagonal spin space-group types with $G = \bar{8}2m$ on *S*-lattices. The last column refers to line numbers in Table B-12, where the possible phase functions are listed, and rules are given to generate the spin space-group symbol.

G_ϵ	G/G_ϵ	Γ	generators	*line*
$\Gamma_e = 1$				
$\bar{8}2m$	1	1	$(\bar{r}_8, \epsilon)(d, \epsilon)$	1
$\bar{8}$	2	2^*	$(\bar{r}_8, \epsilon)(d, 2^*_{\bar{z}})$	1

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Table C-12: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
		$1'$	$(\bar{r}_8, \epsilon)(d, \epsilon')$	1
422	2	2^*	$(\bar{r}_8, 2^{*}_{\bar{z}})(d, \epsilon)$	1
		$1'$	$(\bar{r}_8, \epsilon')(d, \epsilon)$	1
$4m'm'$	2	2^*	$(\bar{r}_8, 2^{*}_{\bar{z}})(d, 2^{*}_{\bar{z}})$	1
		$1'$	$(\bar{r}_8, \epsilon')(d, \epsilon')$	1
4	222	$2^*2^\dagger 2^{*\dagger}$	$(\bar{r}_8, 2^{*}_{\bar{z}})(d, 2^{\dagger}_{\bar{x}})$	1
		$21'$	$(\bar{r}_8, 2^{*}_{\bar{z}})(d, \epsilon')$	1
			$(\bar{r}_8, \epsilon')(d, 2^{*}_{\bar{z}})$	1
			$(\bar{r}_8, 2^{*}_{\bar{z}})(d, 2^{\prime *}_{\bar{z}})$	1
2	422	$4^*2^\dagger 2^{\dagger *}$	$(\bar{r}_8, 4^{*}_{\bar{z}})(d, 2^{\dagger}_{\bar{x}})$	1
1	$\bar{8}m2$	$8^*2^\dagger 2^{*\dagger}$	$(\bar{r}_8, 8^{*}_{\bar{z}})(d, 2^{\dagger}_{\bar{x}})$	1
			$(\bar{r}_8, 8^{3*}_{\bar{z}})(d, 2^{\dagger}_{\bar{x}})$	1
$\Gamma_{\underline{e}} = 2$				
$82m$	1	2	$(\bar{r}_8, \epsilon)(m, \epsilon)$	1
$\bar{8}$	2	4^*	$(\bar{r}_8, \epsilon)(d, 4^{*}_{\bar{z}})$	2
		2^*2^*2	$(\bar{r}_8, \epsilon)(d, 2^{*}_{\bar{x}})$	1
		$21'$	$(\bar{r}_8, \epsilon)(d, \epsilon')$	1
422	2	4^*	$(\bar{r}_8, 4^{*}_{\bar{z}})(d, \epsilon)$	2
		2^*2^*2	$(\bar{r}_8, 2^{*}_{\bar{x}})(d, \epsilon)$	1
		$21'$	$(\bar{r}_8, \epsilon')(d, \epsilon)$	1
$4m'm'$	2	4^*	$(\bar{r}_8, 4^{*}_{\bar{z}})(d, 4^{*}_{\bar{z}})$	2
		2^*2^*2	$(\bar{r}_8, 2^{*}_{\bar{x}})(d, 2^{*}_{\bar{x}})$	1
		$21'$	$(\bar{r}_8, \epsilon')(d, \epsilon')$	1
4	222	$4^*2^\dagger 2^{*\dagger}$	$(\bar{r}_8, 4^{*}_{\bar{z}})(d, 2^{\dagger}_{\bar{x}})$	1
			$(\bar{r}_8, 2^{x})(d, 4^{*}_{\bar{z}})$	4
			$(\bar{r}_8, 2^{\dagger}_{\bar{x}})(d, 2^{*\dagger}_{\overline{xy}})$	3
		$2'2'2'$	$(\bar{r}_8, 2^{*}_{\bar{x}})(d, \epsilon')$	1
			$(\bar{r}_8, \epsilon')(d, 2^{*}_{\bar{x}})$	1
			$(\bar{r}_8, 2^{*}_{\bar{x}})(s, 2^{*\prime}_{\bar{x}})$	1
		$41'$	$(\bar{r}_8, 4^{*}_{\bar{z}})(d, \epsilon')$	3
			$(\bar{r}_8, \epsilon')(d, \epsilon)$	2
			$(\bar{r}_8, 4^{*}_{\bar{z}})(d, 4_{\bar{z}}*')$	4
2	422	$8^*2^\dagger 2^{*\dagger}$	$(\bar{r}_8, 8^{*}_{\bar{z}})(d, 2^{\dagger}_{\bar{x}})$	1
$\Gamma_{\underline{e}} = 2'$				
$82m$	1	$2'$	$(\bar{r}_8, \epsilon)(d, \epsilon)$	1
$\bar{8}$	2	$2'2^*2'^*$	$(\bar{r}_8, \epsilon)(d, 2^{*}_{\bar{z}})$	1
		$21'$	$(\bar{r}_8, \epsilon)(d, \epsilon')$	1
422	2	$2'2^*2'^*$	$(\bar{r}_8, 2^{*}_{\bar{x}})(d, \epsilon)$	1
		$21'$	$(\bar{r}_8, \epsilon')(d, \epsilon)$	1
$4m'm'$	2	$2'2^*2'^*$	$(\bar{r}_8, 2^{*}_{\bar{x}})(d, 2^{*}_{\bar{x}})$	1
		$21'$	$(\bar{r}_8, \epsilon')(d, \epsilon')$	1
4	222	$2'2'2'$	$(\bar{r}_8, 2^{*}_{\bar{x}})(d, \epsilon')$	1
			$(\bar{r}_8, \epsilon')(d, 2^{*}_{\bar{x}})$	1
			$(\bar{r}_8, 2^{*}_{\bar{x}})(d, 2^{\prime *}_{\bar{x}})$	1
2	422	$4221'$	$(\bar{r}_8, 4^{*}_{\bar{z}})(d, 2^{\dagger}_{\bar{x}})$	1
1	$\bar{8}m2$	$8221'$	$(\bar{r}_8, 8^{*}_{\bar{z}})(d, 2^{\dagger}_{\bar{x}})$	1
$\Gamma_{\underline{e}} = 1'$				
$82m$	1	$1'$	$(\bar{r}_8, \epsilon)(d, \epsilon)$	1
$\bar{8}$	2	$21'$	$(\bar{r}_8, \epsilon)(d, 2_{\bar{z}})$	1
422	2	$21'$	$(\bar{r}_8, 2_{\bar{z}})(d, \epsilon)$	1

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Table C-12: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
$4m'm'$	2	$21'$	$(\bar{r}_8, 2_{\bar{z}})(d, 2_{\bar{z}})$	1
4	222	$2'2'2'$	$(\bar{r}_8, 2_{\bar{z}})(d, 2_{\bar{x}})$	1
2	422	$4221'$	$(\bar{r}_8, 4_{\bar{z}})(d, 2_{\bar{x}})$	1
1	$\bar{8}m2$	$8221'$	$(\bar{r}_8, 8_{\bar{z}})(d, 2_{\bar{x}})$	1
			$(\bar{r}_8, 8^3_{\bar{z}})(d, 2_{\bar{x}})$	1
$\Gamma_e = n$				
$\bar{8}2m$	1	n	$(\bar{r}_8, \epsilon)(d, \epsilon)$	8
8	2	$n1'$	$(\bar{r}_8, \epsilon)(d, \epsilon')$	8
422	2	$n1'$	$(\bar{r}_8, \epsilon')(d, \epsilon)$	8
$4m'm'$	2	$n2^*2^*$	$(\bar{r}_8, 2^*_x)(d2^*_x)$	6
		$n1'$	$(\bar{r}_8, \epsilon')(d, \epsilon')$	8
4	222	$(2n)^*2^\dagger 2^{*\dagger}$	$(\bar{r}_8, 2^\dagger_x(2n)^*_z)(d, 2^\dagger_x)$	7
		$n221'$	$(\bar{r}_8, 2^*_x)(d, 2^{*'}_x)$	6
		$(2n)1'$	$(\bar{r}_8, (2n)^*_z)(d, \epsilon')$	9
$\Gamma_e = n'$				
$\bar{8}2m$	1	n'	$(\bar{r}_8, \epsilon')(d, \epsilon')$	8
8	2	$n1'$	$(\bar{r}_8, \epsilon)(d, \epsilon')$	8
422	2	$n1'$	$(\bar{r}_8, \epsilon')(d, \epsilon)$	8
$4m'm'$	2	$n1'$	$(\bar{r}_8, \epsilon')(d, \epsilon')$	8
		$n'2^*2^{*'}$	$(\bar{r}_8, 2^*_x)(d, 2^*_x)$	6
4	222	$n221'$	$(\bar{r}_8, 2^*_x)(d, 2^{*'}_x)$	6
$\Gamma_e = 2^*2^*2$				
$4m'm'$	2	4^*22^*	$(\bar{r}_8, 4^*_z)(d, 4^*_z)$	5
4	222	$4221'$	$(\bar{r}_8, 4^*_z)(s, 4^{*'}_z)$	5

Table C-13: Explicit list of octagonal spin space-group types with $G = 8/m$ on V-lattices. The last column refers to line numbers in Table B-13, where the possible phase functions are listed, and rules are given to generate the spin space-group symbol.

G_ϵ	G/G_ϵ	Γ	generators	*line*
$\Gamma_e = 1$				
$8/m$	1	1	$(r_8, \epsilon)(h, \epsilon)$	1
8	2	2^*	$(r_8, \epsilon)(h, 2^*_z)$	1
		$1'$	$(r_8, \epsilon)(h, \epsilon')$	1
$\bar{8}$	2	2^*	$(r_8, 2^*_z)(h, 2^*_z)$	1
		$1'$	$(r_8, \epsilon')(h, \epsilon')$	1
$4/m$	2	2^*	$(r_8, 2^*_z)(h, \epsilon)$	1
		$1'$	$(r_8, \epsilon')(h, \epsilon)$	1
4	222	$2^*2^\dagger 2^{*\dagger}$	$(r_8, 2^*_z)(h, 2^\dagger_x)$	1
		$21'$	$(r_8, 2^*_z)(h, \epsilon')$	1
			$(r_8, \epsilon')(h, 2^*_z)$	1
			$(r_8, 2^*_z)(h, 2^{*'}_z)$	1
$\bar{4}$	4	4^*	$(r_8, 4^*_z)(h, 2_{\bar{z}})$	1
$2/m$	4	4^*	$(r_8, 4^*_z)(h, \epsilon)$	1
2	$4/m$	$41'$	$(r_8, 4^*_z)(h, \epsilon')$	1
			$(r_8, 4^*_z)(h, 2'_z)$	1
$\bar{2}$	8	8^*	$(r_8, 8^*_z)(h, \epsilon)$	1
			$(r_8, 8^{*3}_z)(h, \epsilon)$	1
$\bar{1}$	8	8^*	$(r_8, 8^*_z)(h, 2_{\bar{z}})$	1

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Table C-13: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
			$(r_8, 8^{*3}_{z})(h, 2_{\bar z})$	1
1	$8/m$	$81'$	$(r_8, 8^{*}_{z})(h, \epsilon')$	1
			$(r_8, 8^{*3}_{z})(h, \epsilon')$	1
			$(r_8, 8^{*}_{z})(h, 2'_{z})$	1
			$(r_8, 8^{*3}_{z})(h, 2'_{z})$	1
$\Gamma_e = 2$				
$8/m$	1	2	$(r_8, \epsilon)(h, \epsilon)$	1
8	2	2^*2^*2	$(r_8, \epsilon)(h, 2^{*}_{x})$	1
		$21'$	$(r_8, \epsilon)(h, \epsilon')$	1
$\bar{8}$	2	2^*2^*2	$(r_8, 2^{*}_{x})(h, 2^{*}_{x})$	1
		$21'$	$(r_8, \epsilon')(h, \epsilon')$	1
$4/m$	2	4^*	$(r_8, 4^{*}_{z})(h, \epsilon)$	1
		2^*2^*2	$(r_8, 2^{*}_{x})(h, \epsilon)$	1
		$21'$	$(r_8, \epsilon')(h, \epsilon)$	1
4	$2/m$	$4^*2^\dagger2^{*\dagger}$	$(r_8, 4^{*}_{z})(h, 2^{\dagger}_{x})$	2
			$(r_8, 2^{\dagger}_{x})(h, 2^{*\dagger}_{xy})$	2
		$41'$	$(r_8, 4^{*}_{z})(h, \epsilon')$	1
		$2'2'2'$	$(r_8, 2^{*}_{x})(m, \epsilon')$	1
			$(r_8, \epsilon')(h, 2^{*}_{x})$	1
			$(r_8, 2^{*}_{x})(h, 2'^{*}_{x})$	1
$2/m$	4	8^*	$(r_8, 8^{*}_{z})(h, \epsilon)$	1
$\Gamma_e = 2'$				
$8/m$	1	$2'$	$(r_8, \epsilon)(h, \epsilon)$	1
8	2	$21'$	$(r_8, \epsilon)(h, \epsilon')$	1
		$2'2^*2'^*$	$(r_8, \epsilon)(h, 2^{*}_{x})$	1
$\bar{8}$	2	$21'$	$(r_8, \epsilon')(h, \epsilon')$	1
		$2'2^*2'^*$	$(r_8, 2^{*}_{x})(h, 2^{*}_{x})$	1
$4/m$	2	$21'$	$(r_8, \epsilon')(h, \epsilon)$	1
		$2'2^*2'^*$	$(r_8, 2^{*}_{x})(h, \epsilon)$	1
4	$2/m$	$2'2'2'$	$(r_8, 2^{*}_{x})(h, \epsilon')$	1
			$(r_8, \epsilon')(h, 2^{*}_{x})$	1
			$(r_8, 2^{*}_{x})(h, 2'^{*}_{x})$	1
$\bar{4}$	4	$41'$	$(r_8, 4^{*}_{z})(h, 2_{\bar z})$	1
$2/m$	4	$41'$	$(r_8, 4^{*}_{z})(h, \epsilon)$	1
$\bar{2}$	8	$81'$	$(r_8, 8^{*}_{z})(h, \epsilon)$	1
$\bar{1}$	8	$81'$	$(r_8, 8^{*}_{z})(h, 2_{\bar z})$	1
$\Gamma_e = 1'$				
$8/m$	1	$1'$	$(r_8, \epsilon)(h, \epsilon)$	1
8	2	$21'$	$(r_8, \epsilon)(h, 2_{\bar z})$	1
$\bar{8}$	2	$21'$	$(r_8, 2_{\bar z})(h, 2_{\bar z})$	1
$4/m$	2	$21'$	$(r_8, 2_{\bar z})(h, \epsilon)$	1
4	$2/m$	$2'2'2'$	$(r_8, 2_{\bar z})(h, 2_{\bar x})$	1
$\bar{4}$	4	$41'$	$(r_8, 4_{\bar z})(h, 2_{\bar z})$	1
$2/m$	4	$41'$	$(r_8, 4_{\bar z})(h, \epsilon)$	1
$\bar{2}$	8	$81'$	$(r_8, 8_{\bar z})(h, \epsilon)$	1
			$(r_8, 3^{3}_{z})(h, \epsilon)$	1
$\bar{1}$	8	$81'$	$(r_8, 8_{\bar z})(h, 2_{\bar z})$	1
			$(r_8, 8^{3}_{z})(h, 2_{\bar z})$	1
$\Gamma_e = 21'$				
$8/m$	1	$21'$	$(r_8, \epsilon)(h, \epsilon)$	1

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Table C-13: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
8	2	$2'2'2'$	$(r_8,\epsilon)(h,2_{\bar{x}})$	1
$\bar{8}$	2	$2'2'2'$	$(r_8,2_{\bar{x}})(h,2_{\bar{x}})$	1
$4/m$	2	$2'2'2'$	$(r_8,2_{\bar{x}})(h,h,\epsilon)$	1
		$41'$	$(r_8,4_{\bar{z}})(h,\epsilon)$	1
4	222	$4221'$	$(r_8,4_{\bar{z}})(h,2_{\bar{x}})$	2
			$(r_8,2_{\bar{x}})(h,2_{\bar{xy}})$	2
$2/m$	4	$81'$	$(r_8,8_{\bar{z}})(h,\epsilon)$	1
$\Gamma_e = n$				
8	2	$n2^*2^*$	$(r_8,2^*_{\bar{x}})(h,2^*_{\bar{x}})$	5
4	$2/m$	$n221'$	$(r_8,\epsilon')(h,2^*_{\bar{x}})$	5
		$(2n)^*2^\dagger 2^{*\dagger}$	$(r_8,2n^*_{\bar{z}})(h,2^\dagger_{\bar{x}})$	6
$\Gamma_e = n'$				
8	2	$n'2^*2'^*$	$(r_8,\epsilon)(h,2^*_{\bar{x}})$	5
4	$2/m$	$n221'$	$(r_8,\epsilon')(h,2^*_{\bar{x}})$	5
$\Gamma_e = n1'$				
8	2	$n221'$	$(r_8,\epsilon)(h,2_{\bar{x}})$	5
4	$2/m$	$(2n)221'$	$(r_8,2n_{\bar{z}})(h,2_{\bar{x}})$	6
$\Gamma_e = 222$				
$8/m$	1	222	$(r_8,\epsilon)(h,\epsilon)$	3*a*
8	2	$2'2'2'$	$(r_8,\epsilon)(h,\epsilon')$	3*a*
$\bar{8}$	2	$2'2'2'$	$(r_8,\epsilon')(h,\epsilon')$	3*a*
$4/m$	2	$2'2'2'$	$(r_8,\epsilon')(h,\epsilon)$	3*a*
		$4^\dagger 2^* 2^{*\dagger}$	$(r_8,4^\dagger_{\bar{z}})(h,\epsilon)$	4
4	$2/m$	$4221'$	$(r_8,4^\dagger_{\bar{z}})(h,\epsilon')$	4
$\Gamma_e = 2'2'2$				
$8/m$	1	$2'2'2$	$(r_8,\epsilon)(h,\epsilon)$	3
8	2	$2'2'2'$	$(r_8,\epsilon)(h,\epsilon')$	3
$\bar{8}$	2	$2'2'2'$	$(r_8,\epsilon')(h,\epsilon')$	3
$4/m$	2	$2'2'2'$	$(r_8,\epsilon')(h,\epsilon)$	3
		$4^\dagger 2^* 2^{*\dagger}$	$(r_8,4^\dagger_{\bar{z}})(h,\epsilon)$	4
4	$2/m$	$4221'$	$(r_8,4^\dagger_{\bar{z}})(h,\epsilon')$	4
$\Gamma_e = 2'2'2'$				
$4/m$	2	$4221'$	$(r_8,4_{\bar{z}})(h,\epsilon)$	4

Table C-14: Explicit list of octagonal spin space-group types with $G = 8/m$ on S-lattices. The last column refers to line numbers in Table B-14, where the possible phase functions are listed, and rules are given to generate the spin space-group symbol.

G_ϵ	G/G_ϵ	Γ	generators	*line*
$\Gamma_e = 1$				
$8/m$	1	1	$(r_8,\epsilon)(h,\epsilon)$	1
8	2	2^*	$(r_8,\epsilon)(h,2^*_z)$	1
		$1'$	$(r_8,\epsilon)(h,\epsilon')$	1
$\bar{8}$	2	2^*	$(r_8,2^*_z)(h,2^*_z)$	1
		$1'$	$(r_8,\epsilon')(h,\epsilon')$	1
$4/m$	2	2^*	$(r_8,2^*_z)(h,\epsilon)$	1
		$1'$	$(r_8,\epsilon')(h,\epsilon)$	1
4	222	$2^*2^\dagger 2^{*\dagger}$	$(r_8,2^*_z)(h,2^\dagger_x)$	1
		$21'$	$(r_8,2^*_z)(h,\epsilon')$	1

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Table C-14: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
			$(r_8,\epsilon')(h,2^*_{\bar z})$	1
			$(r_8,2^*_{\bar z})(h,2^{*\prime}_{\bar z})$	1
$\bar{4}$	4	4^*	$(r_8,4^*_{\bar z})(h,2_{\bar z})$	1
$2/m$	4	4^*	$(r_8,4^*_{\bar z})(h,\epsilon)$	1
2	$4/m$	$41'$	$(r_8,4^*_{\bar z})(h,\epsilon')$	1
			$(r_8,4^*_{\bar z})(h,2'_{\bar z})$	1
$\bar{2}$	8	8^*	$(r_8,8^*_{\bar z})(h,\epsilon)$	1
			$(r_8,8^{*3}_{\bar z})(h,\epsilon)$	1
$\bar{1}$	8	8^*	$(r_8,8^*_{\bar z})(h,2_{\bar z})$	1
			$(r_8,8^{*3}_{\bar z})(h,2_{\bar z})$	1
1	$8/m$	$81'$	$(r_8,8^*_{\bar z})(h,\epsilon')$	1
			$(r_8,8^{*3}_{\bar z})(h,\epsilon')$	1
			$(r_8,8^*_{\bar z})(h,2'_{\bar z})$	1
			$(r_8,8^{*3}_{\bar z})(h,2'_{\bar z})$	1
$\Gamma_e = 2$				
$8/m$	1	2	$(r_8,\epsilon)(h,\epsilon)$	1
8	2	2^*2^*2	$(r_8,\epsilon)(h,2^*_{\bar x})$	1
		$21'$	$(r_8,\epsilon)(h,\epsilon')$	1
$\bar{8}$	2	2^*2^*2	$(r_8,2^*_{\bar x})(h,2^*_{\bar x})$	1
		$21'$	$(r_8,\epsilon')(h,\epsilon')$	1
$4/m$	2	4^*	$(r_8,4^*_{\bar z})(h,\epsilon)$	1
		2^*2^*2	$(r_8,2^*_{\bar x})(h,\epsilon)$	1
		$21'$	$(r_8,\epsilon')(h,\epsilon)$	1
4	$2/m$	$4^*2^\dagger2^{*\dagger}$	$(r_8,4^*_{\bar z})(h,2^\dagger_{\bar x})$	2
			$(r_8,2^\dagger_{\bar x})(h,2^{*\dagger}_{\bar{xy}})$	2
		$41'$	$(r_8,4^*_{\bar z})(h,\epsilon')$	1
		$2'2'2'$	$(r_8,2^*_{\bar x})(m,\epsilon')$	1
			$(r_8,\epsilon')(h,2^*_{\bar x})$	1
			$(r_8,2^*_{\bar x})(h,2'^*_{\bar x})$	1
$2/m$	4	8^*	$(r_8,8^*_{\bar z})(h,\epsilon)$	1
$\Gamma_e = 2'$				
$8/m$	1	$2'$	$(r_8,\epsilon)(h,\epsilon)$	1
8	2	$21'$	$(r_8,\epsilon)(h,\epsilon')$	1
		$2'2^*2'^*$	$(r_8,\epsilon)(h,2^*_{\bar x})$	1
$\bar{8}$	2	$21'$	$(r_8,\epsilon')(h,\epsilon')$	1
		$2'2^*2'^*$	$(r_8,2^*_{\bar x})(h,2^*_{\bar x})$	1
$4/m$	2	$21'$	$(r_8,\epsilon')(h,\epsilon)$	1
		$2'2^*2'^*$	$(r_8,2^*_{\bar x})(h,\epsilon)$	1
4	$2/m$	$2'2'2'$	$(r_8,2^*_{\bar x})(h,\epsilon')$	1
			$(r_8,\epsilon')(h,2^*_{\bar x})$	1
			$(r_8,2^*_{\bar x})(h,2'^*_{\bar x})$	1
$\bar{4}$	4	$41'$	$(r_8,4^*_{\bar z})(h,2_{\bar z})$	1
$2/m$	4	$41'$	$(r_8,4^*_{\bar z})(h,\epsilon)$	1
$\bar{2}$	8	$81'$	$(r_8,8^*_{\bar z})(h,\epsilon)$	1
$\bar{1}$	8	$81'$	$(r_8,8^*_{\bar z})(h,2_{\bar z})$	1
$\Gamma_e = 1'$				
$8/m$	1	$1'$	$(r_8,\epsilon)(h,\epsilon)$	1
8	2	$21'$	$(r_8,\epsilon)(h,2_{\bar z})$	1
$\bar{8}$	2	$21'$	$(r_8,2_{\bar z})(h,2_{\bar z})$	1
$4/m$	2	$21'$	$(r_8,2_{\bar z})(h,\epsilon)$	1

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Table C-14: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
4	$2/m$	$2'2'2'$	$(r_8, 2_{\bar{z}})(h, 2_{\bar{x}})$	1
$\bar{4}$	4	$41'$	$(r_8, 4_{\bar{z}})(h, 2_{\bar{z}})$	1
$2/m$	4	$41'$	$(r_8, 4_{\bar{z}})(h, \epsilon)$	1
$\bar{2}$	8	$81'$	$(r_8, 8_{\bar{z}})(h, \epsilon)$	1
			$(r_8, 3_{\frac{3}{z}})(h, \epsilon)$	1
$\bar{1}$	8	$81'$	$(r_8, 8_{\bar{z}})(h, 2_{\bar{z}})$	1
			$(r_8, 8_{\frac{3}{z}})(h, 2_{\bar{z}})$	1
$\Gamma_e = n$				
8	2	$n2^*2^*$	$(r_8, 2_{\frac{*}{x}})(h, 2_{\frac{*}{x}})$	4
$\bar{8}$	2	$n2^*2^*$	$(r_8, 2_{\frac{*}{x}})(h, 2_{\frac{*}{x}})$	6
4	$2/m$	$n221'$	$(r_8, \epsilon')(h, 2_{\frac{*}{x}})$	4
			$(r_8, 2_{\frac{*}{x}})(h, 2'_{\frac{*}{x}})$	6
		$(2n)^*2^\dagger 2^{*\dagger}$	$(r_8, 2n_{\frac{*}{z}})(h, 2_{\frac{\dagger}{x}})$	5
			$(r_8, 2_{\frac{\dagger}{x}})(h, (2n)_{\bar{z}} 2_{\frac{*\dagger}{x}})$	7
$\Gamma_e = n'$				
8	2	$n'2^*2'^*$	$(r_8, \epsilon)(h, 2_{\frac{*}{x}})$	4
$\bar{8}$	2	$n'2^*2'^*$	$(r_8, 2_{\frac{*}{x}})(h, 2_{\frac{*}{x}})$	6
4	$2/m$	$n221'$	$(r_8, \epsilon')(h, 2_{\frac{*}{x}})$	4
			$(r_8, 2_{\frac{*}{x}})(2'_{\frac{*}{x}})$	6
$\Gamma_e = 2^*2^*2$				
$4/m$	2	$4^\dagger 2^* 2^{*\dagger}$	$(r_8, 4_{\frac{\dagger}{z}})(h, \epsilon)$	3
4	$2/m$	$4221'$	$(r_8, 4_{\frac{\dagger}{z}})(h, \epsilon')$	3

Table C-15: Explicit list of octagonal spin space-group types with $G = 8/mmm$ on V-lattices. The last column refers to line numbers in Table B-15, where the possible phase functions are listed, and rules are given to generate the spin space-group symbol.

G_ϵ	G/G_ϵ	Γ	generators	*line*
$\Gamma_e = 1$				
$8/mmm$	1	1	$(r_8, \epsilon)(m, \epsilon)(h, \epsilon)$	1
$8mm$	2	2^*	$(r_8, \epsilon)(m, \epsilon)(h, 2_{\frac{*}{z}})$	1
		$1'$	$(r_8, \epsilon)(m, \epsilon)(h, \epsilon')$	1
822	2	2^*	$(r_8, \epsilon)(m, 2_{\frac{*}{z}})(h, 2_{\frac{*}{z}})$	1
		$1'$	$(r_8, \epsilon)(m, \epsilon')(h, \epsilon')$	1
$8/8$	2	2^*	$(r_8, \epsilon)(m, 2_{\frac{*}{z}})(h, \epsilon)$	1
		$1'$	$(r_8, \epsilon)(m, \epsilon')(h, \epsilon)$	1
$\bar{8}m2$	2	2^*	$(r_8, 2_{\frac{*}{z}})(m, \epsilon)(h, 2_{\frac{*}{z}})$	1
		$1'$	$(r_8, \epsilon')(m, \epsilon)(h, \epsilon')$	1
$\bar{8}2m$	2	2^*	$(r_8, 2_{\frac{*}{z}})(m, 2_{\frac{*}{z}})(h, 2_{\frac{*}{z}})$	1
		$1'$	$(r_8, \epsilon')(m, \epsilon')(h, \epsilon')$	1
$4/mmm$	2	2^*	$(r_8, 2_{\frac{*}{z}})(m, \epsilon)(h, \epsilon)$	1
		$1'$	$(r_8, \epsilon')(m, \epsilon)(h, \epsilon)$	1
$4/mm'm'$	2	2^*	$(r_8, 2_{\frac{*}{z}})(m, 2_{\frac{*}{z}})(h, \epsilon)$	1
		$1'$	$(r_8, \epsilon')(m, \epsilon')(h, \epsilon)$	1
8	222	$2^*2^\dagger 2^{*\dagger}$	$(r_8, \epsilon)(m, 2_{\frac{*}{z}})(h, 2_{\frac{\dagger}{x}})$	1
		$21'$	$(r_8, \epsilon)(m, 2_{\frac{*}{z}})(h, \epsilon')$	1
			$(r_8, \epsilon)(m, \epsilon')(h, 2_{\frac{*}{z}})$	1
			$(r_8, \epsilon)(m, 2_{\frac{*}{z}})(h, 2_{\frac{*\prime}{z}})$	1
$\bar{8}$	222	$2^*2^\dagger 2^{*\dagger}$	$(r_8, 2_{\frac{*}{z}})(m, 2_{\frac{\dagger}{x}})(h, 2_{\frac{*}{z}})$	1

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Table C-15: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
		$21'$	$(r_8, 2^{*}_{z})(m, \epsilon')(h, 2^{*}_{z})$	1
			$(r_8, \epsilon')(m, 2^{*}_{z})(h, \epsilon')$	1
			$(r_8, 2^{*}_{z})(m, 2^{*\prime}_{z})(h, 2^{*}_{z})$	1
$4mm$	222	$2^*2^\dagger 2^{*\dagger}$	$(r_8, 2^{*}_{z})(m, \epsilon)(h, 2^{\dagger}_{x})$	1
		$21'$	$(r_8, 2^{*}_{z})(m, \epsilon)(h, \epsilon')$	1
			$(r_8, \epsilon')(m, \epsilon)(h, 2^{*}_{z})$	1
			$(r_8, 2^{*}_{z})(m, \epsilon)(h, 2^{*\prime}_{z})$	1
$4m'm'$	2	$2^*2^\dagger 2^{*\dagger}$	$(r_8, 2^{*}_{z})(m, 2^{*}_{z})(h, 2^{\dagger}_{x})$	1
		$21'$	$(r_8, 2^{*}_{z})(m, 2^{*}_{z})(h, \epsilon')$	1
			$(r_8, \epsilon')(m, \epsilon')(h, 2^{*}_{z})$	1
			$(r_8, 2^{*}_{z})(m, 2^{*}_{z})(h, 2^{*\prime}_{z})$	1
422	222	$2^*2^\dagger 2^{*\dagger}$	$(r_8, 2^{*}_{z})(m, 2^{\dagger}_{x})(h, 2^{\dagger}_{x})$	1
		$21'$	$(r_8, 2^{*}_{z})(m, \epsilon')(h, \epsilon')$	1
			$(r_8, \epsilon')(m, 2^{*}_{z})(h, 2^{*}_{z})$	1
			$(r_8, 2^{*}_{z})(m, 2^{*\prime}_{z})(h, 2^{*\prime}_{z})$	1
$42'2'$	222	$2^*2^\dagger 2^{*\dagger}$	$(r_8, 2^{*}_{z})(m, 2^{\dagger}_{x})(h, 2^{*\dagger}_{xy})$	1
		$21'$	$(r_8, 2^{*}_{z})(m, \epsilon')(h, 2^{*\prime}_{z})$	1
			$(r_8, \epsilon')(m, 2^{*}_{z})(h, 2^{*\prime}_{z})$	1
			$(r_8, 2^{*}_{z})(m, 2^{*\prime}_{z})(h, \epsilon')$	1
$4/m$	222	$2^*2^\dagger 2^{*\dagger}$	$(r_8, 2^{*}_{z})(m, 2^{\dagger}_{x})(h, \epsilon)$	1
		$21'$	$(r_8, 2^{*}_{z})(m, \epsilon')(h, \epsilon)$	1
			$(r_8, \epsilon')(m, 2^{*}_{z})(h, \epsilon)$	1
			$(r_8, 2^{*}_{z})(m, 2^{*\prime}_{z})(h, \epsilon)$	1
4	$2'2'2'$	$2'2'2'$	$(r_8, 2^{*}_{z})(m, 2^{\dagger}_{x})(h, \epsilon')$	1
			$(r_8, 2^{*}_{z})(m, \epsilon')(h, 2^{\dagger}_{x})$	1
			$(r_8, \epsilon')(m, 2^{*}_{z})(h, 2^{\dagger}_{x})$	1
			$(r_8, 2'_{z})(m, 2_{\bar{x}})(h, 2_{\bar{y}})$	1
			$(r_8, 2_{\bar{x}})(m, 2'_{z})(h, 2_{\bar{y}})$	1
			$(r_8, 2_{\bar{y}})(m, 2_{\bar{x}})(h, 2'_{z})$	1
			$(r_8, 2'_{z})(m, 2'_{x})(h, 2'_{y})$	1
			$(r_8, 2^{*}_{z})(m, 2^{*\prime}_{z})(h, 2^{\dagger}_{x})$	1
			$(r_8, 2^{*}_{z})(m, 2^{\dagger}_{x})(h, 2^{*\prime}_{z})$	1
			$(r_8, 2^{\dagger}_{x})(m, 2^{*}_{z})(h, 2^{*\prime}_{z})$	1
$\bar{4}$	422	$4^*2^\dagger 2^{*\dagger}$	$(r_8, 4^{*}_{z})(m, 2^{\dagger}_{x})(h, 2_{\bar{z}})$	1
$2/m$	422	$4^*2^\dagger 2^{*\dagger}$	$(r_8, 4^{*}_{z})(m, 2^{\dagger}_{x})(h, \epsilon)$	1
2	$4221'$	$4221'$	$(r_8, 4^{*}_{z})(m, 2^{\dagger}_{x})(h, \epsilon')$	1
			$(r_8, 4^{*}_{z})(m, \epsilon')(h, 2^{\dagger}_{x})$	1
			$(r_8, 4^{*}_{z}), (m, 2^{\dagger}_{x})(h, 2'^{\dagger}_{y})$	1
			$(r_8, 4^{*}_{z})(m, 2^{\dagger}_{x})(h, 2'^{\dagger}_{x})$	1
			$(r_8, 4^{*}_{z})(m, 2'_{z})(h, 2^{\dagger}_{x})$	1
			$(r_8, 4^{*}_{z})(m, 2^{\dagger}_{x})(h, 2'_{z})$	1
$\bar{2}$	822	$8^*2^\dagger 2^{*\dagger}$	$(r_8, 8^{*}_{z})(m, 2^{\dagger}_{x})(h, \epsilon)$	1
			$(r_8, 8^{*}_{z})(m, 2^{\dagger}_{x})(h, \epsilon)$	1
$\bar{1}$	922	$8^*2^\dagger 2^{*\dagger}$	$(r_8, 8^{*}_{z})(m, 2^{\dagger}_{x})(h, 2_{\bar{z}})$	1
			$(r_8, 8^{*3}_{z})(m, 2^{\dagger}_{x})(h, 2_{\bar{z}})$	1
1	$8/mmm$	$8221'$	$(r_8, 8^{*}_{z})(m, 2^{\dagger}_{x})(h, \epsilon')$	1
			$(r_8, 8^{*3}_{z})(m, 2^{\dagger}_{x})(h, \epsilon')$	1
			$(r_8, 8^{*}_{z})(m, \epsilon')(h, 2^{\dagger}_{x})$	1
			$(r_8, 8^{*3}_{z})(m, \epsilon')(h, 2^{\dagger}_{x})$	1

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Table C-15: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
			$(r_8, 8^*_z)(m, 2^\dagger_x)(h, 2'^\dagger_y)$	1
			$(r_8, 8^{*3}_z)(m, 2^\dagger_x)(h, 2'^\dagger_y)$	1
			$(r_8, 8^*_z)(m, 2^\dagger_x)(h, 2'^\dagger_x)$	1
			$(r_8, 8^{*3}_z)(m, 2^\dagger_x)(h, 2'^\dagger_x)$	1
			$(r_8, 8^*_z)(m, 2'_z)(h, 2^\dagger_x)$	1
			$(r_8, 8^{*3}_z)(m, 2'_z)(h, 2^\dagger_x)$	1
			$(r_8, 8^*_z)(m, 2^\dagger_x)(h, 2'_z)$	1
$\Gamma_e = 2$				
$8/mmm$	1	2	$(r_8, \epsilon)(m, \epsilon)(h, \epsilon)$	1
$8mm$	2	2^*2^*2	$(r_8, \epsilon)(m, \epsilon)(h, 2^*_x)$	1
		$21'$	$(r_8, \epsilon)(m, \epsilon)(h, \epsilon')$	1
822	2	2^*2^*2	$(r_8, \epsilon)(m, 2^*_x)(h, 2^*_x)$	1
		$21'$	$(r_8, \epsilon)(m, \epsilon')(h, \epsilon')$	1
$8/m$	2	2^*2^*2	$(r_8, \epsilon)(m, 2^*_x)(h, \epsilon)$	1
		$21'$	$(r_8, \epsilon)(m, \epsilon')(h, \epsilon)$	1
$\bar{8}m2$	2	2^*2^*2	$(r_8, 2^*_x)(m, \epsilon)(h, 2^*_x)$	1
		$21'$	$(r_8, \epsilon')(m, \epsilon)(h, \epsilon')$	1
$\bar{8}2m$	2	2^*2^*2	$(r_8, 2^*_x)(m, 2^*_x)(h, 2^*_x)$	1
		$21'$	$(r_8, \epsilon')(m, \epsilon')(h, \epsilon')$	1
$4/mmm$	2	4^*	$(r_8, 4^*_z)(m, \epsilon)(h, \epsilon)$	4
		2^*2^*2	$(r_8, 2^*_x)(m, \epsilon)(h, \epsilon)$	1
		$21'$	$(r_8, \epsilon')(m, \epsilon)(h, \epsilon)$	1
$4/mm'm'$	2	2^*2^*2	$(r_8, 2^*_x)(m, 2^*_x)(h, \epsilon)$	1
8	222	$4^*2^\dagger 2^{*\dagger}$	$(r_8, \epsilon)(m, 4^*_z)(h, 2^\dagger_x)$	2
		$2'2'2'$	$(r_8, \epsilon)(m, 2^*_x)(h, \epsilon')$	1
			$(r_8, \epsilon)(m, \epsilon')(h, 2^*_x)$	1
			$(r_8, \epsilon)(m, 2^*_x)(h, 2'^*_x)$	1
$\bar{8}$	222	$2'2'2'$	$(r_8, 2^*_x)(m, \epsilon')(h, 2^*_x)$	1
			$(r_8, \epsilon')(m, 2^*_x)(h, \epsilon')$	1
			$(r_8, 2^*_x)(m, 2'^*_x)(h, 2^*_x)$	1
$4mm$	222	$4^*2^\dagger 2^{*\dagger}$	$(r_8, 4^*_z)(m, \epsilon)(h, 2^\dagger_x)$	5
			$(r_8, 2^\dagger_x)(m, \epsilon)(h, 2^{*\dagger}_{xy})$	3
		$2'2'2'$	$(r_8, 2^*_x)(m, \epsilon)(h, \epsilon')$	1
			$(r_8, \epsilon')(m, \epsilon)(h, 2^*_x)$	1
			$(r_8, 2^*_x)(m, \epsilon)(h, 2'^*_x)$	1
		$41'$	$(r_8, 4^*_z)(m, \epsilon)(h, \epsilon')$	4
$4m'm'$	222	$4^*2^\dagger 2^{*\dagger}$	$(r_8, 4^*_z)(m, 4^*_z)(h, 2^\dagger_x)$	6
		$2'2'2'$	$(r_8, 2^*_x)(m, 2^*_x)(h, \epsilon')$	1
			$(r_8, \epsilon')(m, \epsilon')(h, 2^*_x)$	1
			$(r_8, 2^*_x)(m, 2^*_x)(h, 2'^*_x)$	1
422	222	$4^*2^\dagger 2^{*\dagger}$	$(r_8, 4^*_z)(m, 2^\dagger_x)(h, 2^\dagger_x)$	3
			$(r_8, 2^\dagger_x)(m, 2^{*\dagger}_{xy})(h, 2^{*\dagger}_{xy})$	5
		$2'2'2'$	$(r_8, 2^*_x)(m, \epsilon')(h, \epsilon')$	1
			$(r_8, \epsilon')(m, 2^*_x)(h, 2^*_x)$	1
			$(r_8, 2^*_x)(m, 2'^*_x)(h, 2'^*_x)$	1
		$41'$	$(r_8, 4^*_z)(m, \epsilon')(h, \epsilon')$	4
$42'2'$	222	$4^*2^\dagger 2^{*\dagger}$	$(r_8, 2^\dagger_x)(m, 4^*_z)(h, 2^{*\dagger}_{xy})$	6
		$2'2'2'$	$(r_8, 2^*_x)(m, \epsilon')(h, 2'^*_x)$	1
			$(r_8, \epsilon')(m, 2^*_x)(h, 2'^*_x)$	1
			$(r_8, 2^*_x)(m, 2'^*_x)(h, \epsilon')$	1

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Table C-15: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
$4/m$	222	$4^*2^\dagger2^{*\dagger}$	$(r_8, 4^{*}_{z})(m, 2^{\dagger}_{x})(h, \epsilon)$	1
			$(r_8, 2^{\dagger}_{x})(m, 2^{*\dagger}_{xy})$	4
		$2'2'2'$	$(r_8, 2^{*}_{x})(m, \epsilon')(h, \epsilon)$	1
			$(r_8, \epsilon')(m, 2^{*}_{x}))(h, \epsilon)$	1
			$(r_8, 2^{*}_{x})(m, 2^{\prime *}_{x})(h, \epsilon)$	1
		$41'$	$(r_8, 4^{*}_{z})(m, \epsilon')(h, \epsilon)$	4
4	$2/mmm$	$4221'$	$(r_8, 4^{*}_{z})(m, 2^{\dagger}_{x})(h, \epsilon')$	1
			$(r_8, 4^{*}_{z})(m, \epsilon')(h, 2^{\dagger}_{x})$	5
			$(r_8, \epsilon')(m, 4^{*}_{z})(h, 2^{\dagger}_{x})$	2
			$(r_8, 4^{*}_{z})(m, 4^{\prime *}_{z})(h, 2^{\dagger}_{x})$	6
			$(r_8, 4^{*}_{z})(m, 2^{\dagger}_{x})(h, 2^{\prime \dagger}_{x})$	3
			$(r_8, 2^{*\dagger}_{xy})(m, 2^{\dagger}_{x})(2^{\prime \dagger}_{x})$	5
			$(r_8, 2^{\dagger}_{x})(m, 4^{*\prime}_{z})(h, 2^{*\dagger}_{xy})$	6
			$(r_8, 2^{\dagger}_{x})(m, 2^{*\dagger}_{xy})(h, \epsilon')$	4
			$(r_8, 2^{\dagger}_{x})(m, \epsilon')(h, 2^{*\dagger}_{xy})$	3
$2/m$	422	$8^*2^\dagger2^{*\dagger}$	$(r_8, 8^{*}_{z})(m, 2^{\dagger}_{x})(h, \epsilon)$	1
2	$4/mmm$	$8221'$	$(r_8, 8^{*}_{z})(m, 2^{\dagger}_{x})(h, \epsilon')$	1
$\bar{2}$	822	$(16)^*2^\dagger2^{*\dagger}$	$(r_8, 16^{*}_{z})(m, 2^{\dagger}_{x})(h, \epsilon)$	1
			$(r_8, 16^{*3}_{z})(m, 2^{\dagger}_{x})(h, \epsilon)$	1
1	$8/mmm$	$(16)221'$	$(r_8, 16^{*}_{z})(m, 2^{\dagger}_{x})(h, \epsilon')$	1
			$(r_8, 16^{*3}_{z})(m, 2^{\dagger}_{x})(h, \epsilon')$	1
$\Gamma_e = 2'$				
$8/mmm$	1	$2'$	$(r_8, \epsilon)(m, \epsilon)(h, \epsilon)$	1
$8mm$	2	$2'2^*2'^*$	$(r_8, \epsilon)(m, \epsilon)(h, 2^{*}_{x})$	1
		$21'$	$(r_8, \epsilon)(m, \epsilon)(h, \epsilon')$	1
822	2	$2'2^*2'^*$	$(r_8, \epsilon)(m, 2^{*}_{x})(h, 2^{*}_{x})$	1
		$21'$	$(r_8, \epsilon)(m, \epsilon')(h, \epsilon')$	1
$8/m$	2	$2'2^*2'^*$	$(r_8, \epsilon)(m, 2^{*}_{x})(h, \epsilon)$	1
		$21'$	$(r_8, \epsilon)(m, \epsilon')(h, \epsilon)$	1
$\bar{8}m2$	2	$2'2^*2'^*$	$(r_8, 2^{*}_{x})(m, \epsilon)(h, 2^{*}_{x})$	1
		$21'$	$(r_8, \epsilon')(m, \epsilon)(h, \epsilon')$	1
$\bar{8}2m$	2	$2'2^*2'^*$	$(r_8, 2^{*}_{x})(m2^{*}_{x})(h, 2^{*}_{x})$	1
		$21'$	$(r_8, \epsilon')(m, \epsilon')(h, \epsilon')$	1
$4/mmm$	2	$2'2^*2'^*$	$(r_8, 2^{*}_{x})(m, \epsilon)(h, \epsilon)$	1
		$21'$	$(r_8, \epsilon')(m, \epsilon)(h, \epsilon)$	1
$4/mm'm'$	2	$2'2^*2'^*$	$(r_8, 2^{*}_{x})(m, 2^{*}_{x})(h, \epsilon)$	1
		$21'$	$(r_8, \epsilon')(m, \epsilon')(h, \epsilon)$	1
8	222	$2'2'2'$	$(r_8, \epsilon)(m, 2^{*}_{x})(h, \epsilon')$	1
			$(r_8, \epsilon)(m, \epsilon')(h, 2^{*}_{x})$	1
			$(r_8, \epsilon)(m, 2^{*}_{x})(h, 2^{\prime *}_{x})$	1
$\bar{8}$	222	$2'2'2'$	$(r_8, 2^{*}_{x})(m, \epsilon')(h, 2^{*}_{x})$	1
			$(r_8, \epsilon')(m, 2^{*}_{x})(h, \epsilon')$	1
			$(r_8, 2^{*}_{x})(m, 2^{\prime *}_{x})(h, 2^{*}_{x})$	1
$4mm$	222	$2'2'2'$	$(r_8, 2^{*}_{x})(m, \epsilon)(h, \epsilon')$	1
			$(r_8, \epsilon')(m, \epsilon)(h, 2^{*}_{x})$	1
			$(r_8, 2^{*}_{x})(m, \epsilon)(h, 2^{\prime *}_{x})$	1
$4m'm'$	222	$2'2'2'$	$(r_8, 2^{*}_{x})(m, 2^{*}_{x})(h, \epsilon')$	1
			$(r_8, \epsilon')(m, \epsilon')(h, 2^{*}_{x})$	1
			$(r_8, 2^{*}_{x})(m, 2^{*}_{x})(h, 2^{\prime *}_{x})$	1

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Table C-15: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
422	222	$2'2'2'$	$(r_8, 2_{\bar{x}}^{*})(m, \epsilon')(h, \epsilon')$	1
			$(r_8, \epsilon')(m, 2_{\bar{x}}^{*})(h, 2_{\bar{x}}^{*})$	1
			$(r_8, 2_{\bar{x}}^{*})(m, 2_{\bar{x}}^{\prime *})(h, 2_{\bar{x}}^{\prime *})$	1
$42'2'$	222	$2'2'2'$	$(r_8, 2_{\bar{x}}^{*})(m, \epsilon')(h, 2_{\bar{x}}^{\prime *})$	1
			$(r_8, \epsilon')(m, 2_{\bar{x}}^{*})(h, 2_{\bar{x}}^{\prime *})$	1
			$(r_8, 2_{\bar{x}}^{*})(m, 2_{\bar{x}}^{\prime *})(h, \epsilon')$	1
$4/m$	222	$2'2'2'$	$(r_8, 2_{\bar{x}}^{*})(m, \epsilon')(h, \epsilon)$	1
			$(r_8, \epsilon')(m, 2_{\bar{x}}^{*})(h, \epsilon)$	1
			$(r_8, 2_{\bar{x}}^{*})(m, 2_{\bar{x}}^{\prime *})(h, \epsilon)$	1
$\bar{4}$	422	$4221'$	$(r_8, 4_{\bar{z}}^{*})(m, 2_{\bar{x}}^{\dagger})(h, 2_{\bar{z}})$	1
$2/m$	422	$4221'$	$(r_8, 4_{\bar{z}}^{*})(m, 2_{\bar{x}}^{\dagger})(h, \epsilon)$	1
$\bar{2}$	822	$8221'$	$(r_8, 8_{\bar{z}}^{*})(m, 2_{\bar{x}}^{\dagger})(h, \epsilon)$	1
$\bar{1}$	822	$8221'$	$(r_8, 8_{\bar{z}}^{*})(m, 2_{\bar{x}}^{\dagger})(h, 2_{\bar{z}})$	1
$\Gamma_e = 1'$				
$8/mmm$	1	$1'$	$(r_8, \epsilon)(m, \epsilon)(h, \epsilon)$	1
$8mm$	2	$21'$	$(r_8, \epsilon)(m, \epsilon)(h, 2_{\bar{z}})$	1
822	2	$21'$	$(r_8, \epsilon)(m, 2_{\bar{z}})(h, 2_{\bar{z}})$	1
$8/m$	2	$21'$	$(r_8, \epsilon)(m, 2_{\bar{z}})(h, \epsilon)$	1
$\bar{8}m2$	2	$21'$	$(r_8, 2_{\bar{z}})(m, \epsilon)(h, 2_{\bar{z}})$	1
$\bar{8}2m$	2	$21'$	$(r_8, 2_{\bar{z}})(m, 2_{\bar{z}})(h, 2_{\bar{z}})$	1
$4/mmm$	2	$21'$	$(r_8, 2_{\bar{z}})(m, \epsilon)(h, \epsilon)$	1
$4/mm'm'$	2	$21'$	$(r_8, 2_{\bar{z}})(m, 2_{\bar{z}})(h, \epsilon)$	1
8	222	$2'2'2'$	$(r_8, \epsilon)(m, 2_{\bar{z}})(h, 2_{\bar{x}})$	1
$\bar{8}$	222	$2'2'2'$	$(r_8, 2_{\bar{z}})(m, 2_{\bar{x}})(h, 2_{\bar{z}})$	1
$4mm$	222	$2'2'2'$	$(r_8, 2_{\bar{z}})(m, \epsilon)(h, 2_{\bar{x}})$	1
$4m'm'$	222	$2'2'2'$	$(r_8, 2_{\bar{z}})(m, 2_{\bar{z}})(h, 2_{\bar{x}})$	1
422	222	$2'2'2'$	$(r_8, 2_{\bar{z}})(m, 2_{\bar{x}})(h, 2_{\bar{x}})$	1
$42'2'$	222	$2'2'2'$	$(r_8, 2_{\bar{z}})(m, 2_{\bar{x}})(h, 2_{\bar{y}})$	1
$4/m$	222	$2'2'2'$	$(r_8, 2_{\bar{z}})(m, 2_{\bar{x}})(h, \epsilon)$	1
$\bar{4}$	422	$4221'$	$(r_8, 4_{\bar{z}})(m, 2_{\bar{x}})(h, 2_{\bar{z}})$	1
$2/m$	422	$4221'$	$(r_8, 4_{\bar{z}})(m, 2_{\bar{x}})(h, \epsilon)$	1
$\bar{2}$	822	$8221'$	$(r_8, 8_{\bar{z}})(m, 2_{\bar{x}})(h, \epsilon)$	1
			$(r_8, 8_{\bar{z}}^{3})(m, 2_{\bar{x}})(h, \epsilon)$	1
$\bar{1}$	822	$8221'$	$(r_8, 8_{\bar{z}})(m, 2_{\bar{x}})(h, 2_{\bar{z}})$	1
			$(r_8, 8_{\bar{z}}^{3})(m, 2_{\bar{x}})(h, 2_{\bar{z}})$	1
$\Gamma_e = 21'$				
$8/mmm$	1	$21'$	$(r_8, \epsilon)(m, \epsilon)(h, \epsilon)$	1
$8mm$	2	$2'2'2'$	$(r_8, \epsilon)(m, \epsilon)(h, 2_{\bar{x}})$	1
822	2	$2'2'2'$	$(r_8, \epsilon)(m, 2_{\bar{x}})(h, 2_{\bar{x}})$	1
$8/m$	2	$2'2'2'$	$(r_8, \epsilon)(m, \epsilon)(h, 2_{\bar{x}})$	1
$\bar{8}m2$	2	$2'2'2'$	$(r_8, 2_{\bar{x}})(m, \epsilon)(h, 2_{\bar{x}})$	1
$\bar{8}2m$	2	$2'2'2'$	$(r_8, 2_{\bar{x}})(m, 2_{\bar{x}})(h, 2_{\bar{x}})$	1
$4/mmm$	2	$41'$	$(r_8, 4_{\bar{z}})(m, \epsilon)(h, \epsilon)$	4
		$2'2'2'$	$(r_8, 2_{\bar{x}})(m, \epsilon)(h, \epsilon)$	1
		$2'2'2'$	$(r_8, 2_{\bar{x}})(m, 2_{\bar{x}})(h, \epsilon)$	1
8	222	$4221'$	$(r_8, \epsilon)(m, 4_{\bar{z}})(h, 2_{\bar{x}})$	2
$4mm$	222	$4221'$	$(r_8, 4_{\bar{z}})(m, \epsilon)(h, 2_{\bar{x}})$	5
			$(r_8, 2_{\bar{x}})(m, \epsilon)(h, 2_{\bar{x}\bar{y}})$	3
$4m'm'$	222	$4221'$	$(r_8, 4_{\bar{z}})(m, 4_{\bar{z}})(h, 2_{\bar{x}})$	6
422	222	$4221'$	$(r_8, 4_{\bar{z}})(m, 2_{\bar{x}})(h, 2_{\bar{x}})$	3

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Table C-15: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
			$(r_8, 2_{\bar{x}})(m, 2_{\overline{xy}})(h, 2_{\overline{xy}})$	5
$42'2'$	222	$4221'$	$(r_8, 2_{\bar{x}})(m, 4_{\bar{z}})(h, 2_{\overline{xy}})$	6
$4/m$	222	$4221'$	$(r_8, 4_{\bar{z}})(m, 2_{\bar{x}})(h, \epsilon)$	1
			$(r_8, 2_{\bar{x}})(m, 2_{\overline{xy}})(h, \epsilon)$	4
$2/m$	422	$8221'$	$(r_8, 8_{\bar{z}})(m, 2_{\bar{x}})h, \epsilon)$	1
$\bar{2}$	822	$(16)221'$	$(r_8, 16_{\bar{z}})(m, 2_{\bar{x}})(h, \epsilon)$	1
			$(r_8, 16^{3}_{\bar{z}}(m, 2_{\bar{x}})(h, \epsilon)$	1
$\Gamma_e = n$				
$8mm$	2	$n2^*2^*$	$(r_8, \epsilon)(m, \epsilon)(h, 2^{*}_{\bar{x}})$	9
8	222	$n221'$	$(r_8, \epsilon)(m, \epsilon')(h, 2^{*}_{\bar{x}})$	9
		$(2n)^*2^\dagger2^{*\dagger}$	$(r_8, \epsilon)(m, 2n^{*}_{\bar{z}})(h, 2^{\dagger}_{\bar{x}})$	10
$4mm$	222	$n221'$	$(r_8, \epsilon')(m, \epsilon)(h, 2^{*}_{\bar{x}})$	9
		$(2n)^*2^\dagger2^{*\dagger}$	$(r_8, 2n^{*}_{\bar{z}})(m, \epsilon)(h, 2^{\dagger}_{\bar{x}})$	11
$4m'm'$	222	$n221'$	$(r_8, \epsilon')(m, \epsilon')(h, 2^{*}_{\bar{x}})$	9
		$(2n)^*2^\dagger2^{*\dagger}$	$(r_8, 2n^{*}_{\bar{z}})(m, 2n^{*}_{\bar{z}})(h, 2^{\dagger}_{\bar{x}})$	12
4	$2'2'2'$	$(2n)221'$	$(r_8, 2n^{*}_{\bar{z}})(m, \epsilon')(h, 2^{\dagger}_{\bar{x}})$	11
			$(r_8, \epsilon')(m2n^{*}_{\bar{z}})(h, 2^{\dagger}_{\bar{x}})$	10
			$(r_8, 2n^{*}_{\bar{z}})(m, 2n^{\prime *}_{\bar{z}})(h, 2^{\dagger}_{\bar{x}})$	12
$\Gamma_e = n'$				
$8mm$	2	$n'2^*2'^*$	$(r_8, \epsilon)(m, \epsilon)(h, 2^{*}_{\bar{x}})$	9
8	222	$n221'$	$(r_8, \epsilon)(m, \epsilon')(h, 2^{*}_{\bar{x}})$	9
$4mm$	222	$n221'$	$(r_8, \epsilon')(m, \epsilon)(h, 2^{*}_{\bar{x}})$	9
$4m'm'$	222	$n221'$	$(r_8, \epsilon')(m, \epsilon')(h, 2^{*}_{\bar{x}})$	9
$\Gamma_e = n1'$				
8	222	$(2n)221'$	$(r_8, \epsilon)(h, (2n)_{\bar{z}})(h, 2_{\bar{x}})$	10
$4mm$	222	$(2n)221'$	$(r_8, (2n)_{\bar{z}})(m, \epsilon)(h, 2_{\bar{x}})$	11
$4m'm'$	222	$(2n)221'$	$(r_8, (2n)_{\bar{z}})(m, (2n)_{\bar{z}})(h, 2_{\bar{x}})$	12
$\Gamma_e = 222$				
$8/mmm$	1	222	$(r_8, \epsilon)(m, \epsilon)(h, \epsilon)$	$7a$
$8mm$	2	$2'2'2'$	$(r_8, \epsilon)(m, \epsilon)(h, \epsilon')$	$7a$
822	2	$2'2'2'$	$(r_8, \epsilon)(m, \epsilon')(h, \epsilon')$	$7a$
$8/m$	2	$2'2'2'$	$(r_8, \epsilon)(m, \epsilon')(h, \epsilon)$	$7a$
$\bar{8}m2$	2	$2'2'2'$	$(r_8, \epsilon')(m, \epsilon)(h, \epsilon')$	$7a$
$\bar{8}2m$	2	$2'2'2'$	$(r_8, \epsilon')(m, \epsilon')(h, \epsilon')$	$7a$
$4/mmm$	2	$2'2'2'$	$(r_8, \epsilon')(m, \epsilon)(h, \epsilon)$	$7a$
		$4^\dagger2^*2^{*\dagger}$	$(r_8, 4^{\dagger}_{\bar{z}})(m, \epsilon)(h, \epsilon)$	8
$4/mm'm'$	2	$2'2'2'$	$(r_8, \epsilon')(m, \epsilon')(h, \epsilon)$	$7a$
$4mm$	222	$4221'$	$(r_8, 4^{\dagger}_{\bar{z}})(m, \epsilon)(h, \epsilon')$	8
422	222	$4221'$	$(r_8, 4^{\dagger}_{\bar{z}})(m, \epsilon')(h, \epsilon')$	8
$4/m$	222	$4221'$	$(r_8, 4^{\dagger}_{\bar{z}})(m, \epsilon')(h, \epsilon)$	8
$\Gamma_e = 2'2'2$				
$8/mmm$	1	$2'2'2$	$(r_8, \epsilon)(m, \epsilon)(h, \epsilon)$	7
$8mm$	2	$2'2'2'$	$(r_8, \epsilon)(m, \epsilon)(h, \epsilon')$	7
822	2	$2'2'2'$	$(r_8, \epsilon)(m, \epsilon')(h, \epsilon')$	7
$8/m$	2	$2'2'2'$	$(r_8, \epsilon)(m, \epsilon')(h, \epsilon)$	7
$\bar{8}m2$	2	$2'2'2'$	$(r_8, \epsilon')(m, \epsilon)(h, \epsilon')$	7
$\bar{8}2m$	2	$2'2'2'$	$(r_8, \epsilon')(m, \epsilon')(h, \epsilon')$	7
$4/mmm$	2	$2'2'2'$	$(r_8, \epsilon')(m, \epsilon)(h, \epsilon)$	7
		$4^\dagger2^*2^{*\dagger}$	$(r_8, 4^{\dagger}_{\bar{z}})(m, \epsilon)(h, \epsilon)$	8

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Table C-15: continued

G_ϵ	G/G_ϵ	Γ	generators	*line*
$4/mm'm'$	2	$2'2'2'$	$(r_8, \epsilon')(m, \epsilon')(h, \epsilon)$	7
$4mm$	222	$4221'$	$(r_8, 4_z^{\dagger})(m, \epsilon)(h, \epsilon')$	8
422	222	$4221'$	$(r_8, 4_z^{\dagger})(m, \epsilon')(h, \epsilon')$	8
$4/m$	222	$4221'$	$(r_8, 4_z^{\dagger})(m, \epsilon')(h, \epsilon)$	8
$\Gamma_e = 2'2'2'$				
$4/mmm$	2	$4221'$	$(r_8, 4_z^{-})(m, \epsilon)(h, \epsilon)$	8

Table C-16: Explicit list of octagonal spin space-group types with $G = 8/mmm$ on S-lattices. The last column refers to line numbers in Table B-16, where the possible phase functions are listed, and rules are given to generate the spin space-group symbol.

G_ϵ	Γ	generators	*line*
$\Gamma_e = 1$			
$8/mmm$	1	$(r_8, \epsilon)(m, \epsilon)(h, \epsilon)$	1
$8mm$	2^*	$(r_8, \epsilon)(m, \epsilon)(h, 2_z^*)$	1
	$1'$	$(r_8, \epsilon)(m, \epsilon)(h, \epsilon')$	1
822	2^*	$(r_8, \epsilon)(m, 2_z^*)(h, 2_z^*)$	1
	$1'$	$(r_8, \epsilon)(m, \epsilon')(h, \epsilon')$	1
$8/m$	2^*	$(r_8, \epsilon)(m, 2_z^*)(h, \epsilon)$	1
	$1'$	$(r_8, \epsilon)(m, \epsilon')(h, \epsilon)$	1
$\bar{8}m2$	2^*	$(r_8, 2_z^*)(m, \epsilon)(h, 2_z^*)$	1
	$1'$	$(r_8, \epsilon')(m, \epsilon)(h, \epsilon')$	1
$\bar{8}2m$	2^*	$(r_8, 2_z^*)(m, 2_z^*)(h, 2_z^*)$	1
	$1'$	$(r_8, \epsilon')(m, \epsilon')(h, \epsilon')$	1
$4/mmm$	2^*	$(r_8, 2_z^*)(m, \epsilon)(h, \epsilon)$	1
	$1'$	$(r_8, \epsilon')(m, \epsilon)(h, \epsilon)$	1
$4/mm'm'$	2^*	$(r_8, 2_z^*)(m, 2_z^*)(h, \epsilon)$	1
	$1'$	$(r_8, \epsilon')(m, \epsilon')(h, \epsilon)$	1
8	$2^*2^{\dagger}2^{*\dagger}$	$(r_8, \epsilon)(m, 2_z^*)(h, 2_x^{\dagger})$	1
	$21'$	$(r_8, \epsilon)(m, 2_z^*)(h, \epsilon')$	1
		$(r_8, \epsilon)(m, \epsilon')(h, 2_z^*)$	1
		$(r_8, \epsilon)(m, 2_z^*)(h, 2_z^{*\prime})$	1
$\bar{8}$	$2^*2^{\dagger}2^{*\dagger}$	$(r_8, 2_z^*)(m, 2_x^{\dagger})(h, 2_z^*)$	1
	$21'$	$(r_8, 2_z^*)(m, \epsilon')(h, 2_z^*)$	1
		$(r_8, \epsilon')(m, 2_z^*)(h, \epsilon')$	1
		$(r_8, 2_z^*)(m, 2_z^{*\prime})(h, 2_z^*)$	1
$4mm$	$2^*2^{\dagger}2^{*\dagger}$	$(r_8, 2_z^*)(m, \epsilon)(h, 2_x^{\dagger})$	1
	$21'$	$(r_8, 2_z^*)(m, \epsilon)(h, \epsilon')$	1
		$(r_8, \epsilon')(m, \epsilon)(h, 2_z^*)$	1
		$(r_8, 2_z^*)(m, \epsilon)(h, 2_z^{*\prime})$	1
$4m'm'$	$2^*2^{\dagger}2^{*\dagger}$	$(r_8, 2_z^*)(m, 2_z^*)(h, 2_x^{\dagger})$	1
	$21'$	$(r_8, 2_z^*)(m, 2_z^*)(h, \epsilon')$	1
		$(r_8, \epsilon')(m, \epsilon')(h, 2_z^*)$	1
		$(r_8, 2_z^*)(m, 2_z^*)(h, 2_z^{*\prime})$	1
422	$2^*2^{\dagger}2^{*\dagger}$	$(r_8, 2_z^*)(m, 2_x^{\dagger})(h, 2_x^{\dagger})$	1
	$21'$	$(r_8, 2_z^*)(m, \epsilon')(h, \epsilon')$	1
		$(r_8, \epsilon')(m, 2_z^*)(h, 2_z^*)$	1
		$(r_8, 2_z^*)(m, 2_z^{*\prime})(h, 2_z^{*\prime})$	1
$42'2'$	$2^*2^{\dagger}2^{*\dagger}$	$(r_8, 2_z^*)(m, 2_x^{\dagger})(h, 2_{xy}^{*\dagger})$	1

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Table C-16: continued

G_ϵ	Γ	generators	*line*
	$21'$	$(r_8, 2^{*}_{\bar{z}})(m, \epsilon')(h, 2^{*\prime}_{\bar{z}})$	1
		$(r_8, \epsilon')(m, 2^{*}_{\bar{z}})(h, 2^{*\prime}_{\bar{z}})$	1
		$(r_8, 2^{*}_{\bar{z}})(m, 2^{*\prime}_{\bar{z}})(h, \epsilon')$	1
$4/m$	$2^{*}2^{\dagger}2^{*\dagger}$	$(r_8, 2^{*}_{\bar{z}})(m, 2^{\dagger}_{\bar{x}})(h, \epsilon)$	1
	$21'$	$(r_8, 2^{*}_{\bar{z}})(m, \epsilon')(h, \epsilon)$	1
		$(r_8, \epsilon')(m, 2^{*}_{\bar{z}})(h, \epsilon)$	1
		$(r_8, 2^{*}_{\bar{z}})(m, 2^{*\prime}_{\bar{z}})(h, \epsilon)$	1
4	$2'2'2'$	$(r_8, 2^{*}_{\bar{z}})(m, 2^{\dagger}_{\bar{x}})(h, \epsilon')$	1
		$(r_8, 2^{*}_{\bar{z}})(m, \epsilon')(h, 2^{\dagger}_{\bar{x}})$	1
		$(r_8, \epsilon')(m, 2^{*}_{\bar{z}})(h, 2^{\dagger}_{\bar{x}})$	1
		$(r_8, 2'_{\bar{z}})(m, 2_{\bar{x}})(h, 2_{\bar{y}})$	1
		$(r_8, 2_{\bar{x}})(m, 2'_{\bar{z}})(h, 2_{\bar{y}})$	1
		$(r_8, 2_{\bar{y}})(m, 2_{\bar{x}})(h, 2'_{\bar{z}})$	1
		$(r_8, 2'_{\bar{z}})(m, 2'_{\bar{x}})(h, 2'_{\bar{y}})$	1
		$(r_8, 2^{*}_{\bar{z}})(m, 2^{*\prime}_{\bar{z}})(h, 2^{\dagger}_{\bar{x}})$	1
		$(r_8, 2^{*}_{\bar{z}})(m, 2^{\dagger}_{\bar{x}})(h, 2^{*\prime}_{\bar{z}})$	1
		$(r_8, 2^{\dagger}_{\bar{x}})(m, 2^{*}_{\bar{z}})(h, 2^{*\prime}_{\bar{z}})$	1
$\bar{4}$	$4^{*}2^{\dagger}2^{*\dagger}$	$(r_8, 4^{*}_{\bar{z}})(m, 2^{\dagger}_{\bar{x}})(h, 2_{\bar{z}})$	1
$2/m$	$4^{*}2^{\dagger}2^{*\dagger}$	$(r_8, 4^{*}_{\bar{z}})(m, 2^{\dagger}_{\bar{x}})(h, \epsilon)$	1
2	$4221'$	$(r_8, 4^{*}_{\bar{z}})(m, 2^{\dagger}_{\bar{x}})(h, \epsilon')$	1
		$(r_8, 4^{*}_{\bar{z}})(m, \epsilon')(h, 2^{\dagger}_{\bar{x}})$	1
		$(r_8, 4^{*}_{\bar{z}}), (m, 2^{\dagger}_{\bar{x}})(h, 2^{\prime\dagger}_{\bar{y}})$	1
		$(r_8, 4^{*}_{\bar{z}})(m, 2^{\dagger}_{\bar{x}})(h, 2^{\prime\dagger}_{\bar{x}})$	1
		$(r_8, 4^{*}_{\bar{z}})(m, 2'_{\bar{z}})(h, 2^{\dagger}_{\bar{x}})$	1
		$(r_8, 4^{*}_{\bar{z}})(m, 2^{\dagger}_{\bar{x}})(h, 2'_{\bar{z}})$	1
$\bar{2}$	$8^{*}2^{\dagger}2^{*\dagger}$	$(r_8, 8^{*}_{\bar{z}})(m, 2^{\dagger}_{\bar{x}})(h, \epsilon)$	1
		$(r_8, 8^{*}_{\bar{z}})(m, 2^{\dagger}_{\bar{x}})(h, \epsilon)$	1
$\bar{1}$	$8^{*}2^{\dagger}2^{*\dagger}$	$(r_8, 8^{*}_{\bar{z}})(m, 2^{\dagger}_{\bar{x}})(h, 2_{\bar{z}})$	1
		$(r_8, 8^{*3}_{\bar{z}})(m, 2^{\dagger}_{\bar{x}})(h, 2_{\bar{z}})$	1
1	$8221'$	$(r_8, 8^{*}_{\bar{z}})(m, 2^{\dagger}_{\bar{x}})(h, \epsilon')$	1
		$(r_8, 8^{*3}_{\bar{z}})(m, 2^{\dagger}_{\bar{x}})(h, \epsilon')$	1
		$(r_8, 8^{*}_{\bar{z}})(m, \epsilon')(h, 2^{\dagger}_{\bar{x}})$	1
		$(r_8, 8^{*3}_{\bar{z}})(m, \epsilon')(h, 2^{\dagger}_{\bar{x}})$	1
		$(r_8, 8^{*}_{\bar{z}})(m, 2^{\dagger}_{\bar{x}})(h, 2^{\prime\dagger}_{\bar{y}})$	1
		$(r_8, 8^{*3}_{\bar{z}})(m, 2^{\dagger}_{\bar{x}})(h, 2^{\prime\dagger}_{\bar{y}})$	1
		$(r_8, 8^{*}_{\bar{z}})(m, 2^{\dagger}_{\bar{x}})(h, 2^{\prime\dagger}_{\bar{x}})$	1
		$(r_8, 8^{*3}_{\bar{z}})(m, 2^{\dagger}_{\bar{x}})(h, 2^{\prime\dagger}_{\bar{x}})$	1
		$(r_8, 8^{*}_{\bar{z}})(m, 2'_{\bar{z}})(h, 2^{\dagger}_{\bar{x}})$	1
		$(r_8, 8^{*3}_{\bar{z}})(m, 2'_{\bar{z}})(h, 2^{\dagger}_{\bar{x}})$	1
		$(r_8, 8^{*}_{\bar{z}})(m, 2^{\dagger}_{\bar{x}})(h, 2'_{\bar{z}})$	1
$\Gamma_e = 2$			
$8/mmm$	2	$(r_8, \epsilon)(m, \epsilon)(h, \epsilon)$	1
$8mm$	$2^{*}2^{*}2$	$(r_8, \epsilon)(m, \epsilon)(h, 2^{*}_{\bar{x}})$	1
	$21'$	$(r_8, \epsilon)(m, \epsilon)(h, \epsilon')$	1
822	$2^{*}2^{*}2$	$(r_8, \epsilon)(m, 2^{*}_{\bar{x}})(h, 2^{*}_{\bar{x}})$	1
	$21'$	$(r_8, \epsilon)(m, \epsilon')(h, \epsilon')$	1
$8/m$	$2^{*}2^{*}2$	$(r_8, \epsilon)(m, 2^{*}_{\bar{x}})(h, \epsilon)$	1
	$21'$	$(r_8, \epsilon)(m, \epsilon')(h, \epsilon)$	1

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Table C-16: continued

G_ϵ	Γ	generators	*line*
$\bar{8}m2$	2^*2^*2	$(r_8, 2_x^*)(m, \epsilon)(h, 2_x^*)$	1
	$21'$	$(r_8, \epsilon')(m, \epsilon)(h, \epsilon')$	1
$\bar{8}2m$	2^*2^*2	$(r_8, 2_x^*)(m, 2_x^*)(h, 2_x^*)$	1
	$21'$	$(r_8, \epsilon')(m, \epsilon')(h, \epsilon')$	1
$4/mmm$	2^*2^*2	$(r_8, 2_x^*)(m, \epsilon)(h, \epsilon)$	1
	$21'$	$(r_8, \epsilon')(m, \epsilon)(h, \epsilon)$	1
$4/mm'm'$	4^*	$(r_8, 4_z^*)(m, 4_z^*)(h, \epsilon)$	5
	2^*2^*2	$(r_8, 2_x^*)(m, 2_x^*)(h, \epsilon)$	1
8	$4^*2^\dagger 2^{*\dagger}$	$(r_8, \epsilon)(m, 4_z^*)(h, 2_x^\dagger)$	2
	$2'2'2'$	$(r_8, \epsilon)(m, 2_x^*)(h, \epsilon')$	1
		$(r_8, \epsilon)(m, \epsilon')(h, 2_x^*)$	1
		$(r_8, \epsilon)(m, 2_x^*)(h, 2_x'^*)$	1
$\bar{8}$	$4^*2^\dagger 2^{*\dagger}$	$(r_8, 2_x^\dagger)(m, 2_{xy}^{*\dagger})(h, 2_x^\dagger)$	4
	$2'2'2'$	$(r_8, 2_x^*)(m, \epsilon')(h, 2_x^*)$	1
		$(r_8, \epsilon')(m, 2_x^*)(h, \epsilon')$	1
		$(r_8, 2_x^*)(m, 2_x'^*)(h, 2_x^*)$	1
$4mm$	$4^*2^\dagger 2^{*\dagger}$	$(r_8, 4_z^*)(m, \epsilon)(h, 2_x^\dagger)$	6
	$2'2'2'$	$(r_8, 2_x^*)(m, \epsilon)(h, \epsilon')$	1
		$(r_8, \epsilon')(m, \epsilon)(h, 2_x^*)$	1
		$(r_8, 2_x^*)(m, \epsilon)(h, 2_x'^*)$	1
$4m'm'$	$4^*2^\dagger 2^{*\dagger}$	$(r_8, 4_z^*)(m, 4_z^*)(h, 2_x^\dagger)$	7
	$2'2'2'$	$(r_8, 2_x^*)(m, 2_x^*)(h, \epsilon')$	1
		$(r_8, \epsilon')(m, \epsilon')(h, 2_x^*)$	1
		$(r_8, 2_x^*)(m, 2_x^*)(h, 2_x'^*)$	1
	$41'$	$(r_8, 4_z^*)(m, 4_z^*)(h, \epsilon')$	5
422	$4^*2^\dagger 2^{*\dagger}$	$(r_8, 2_x^\dagger)(m, 2_{xy}^{*\dagger})(h, 2_{xy}^{*\dagger})$	4
	$2'2'2'$	$(r_8, 2_x^*)(m, \epsilon')(h, \epsilon')$	1
		$(r_8, \epsilon')(m, 2_x^*)(h, 2_x^*)$	1
		$(r_8, 2_x^*)(m, 2_x'^*)(h, 2_x'^*)$	1
$42'2'$	$4^*2^\dagger 2^{*\dagger}$	$(r_8, 4_z^*)(m, 2_x^\dagger)(h, 2_{xy}^{*\dagger})$	3
		$(r_8, 2_x^\dagger)(m, 4_z^*)(h, 2_{xy}^{*\dagger})$	7
	$2'2'2'$	$(r_8, 2_x^*)(m, \epsilon')(h, 2_x'^*)$	1
		$(r_8, \epsilon')(m, 2_x^*)(h, 2_x'^*)$	1
		$(r_8, 2_x^*)(m, 2_x'^*)(h, \epsilon')$	1
	$41'$	$(r_8, 4_z^*)(m, 4_z'^*)(h, \epsilon')$	5
$4/m$	$4^*2^\dagger 2^{*\dagger}$	$(r_8, 4_z^*)(m, 2_x^\dagger)(h, \epsilon)$	1
		$(r_8, 2_x^\dagger)(m, 4_z^*)(h, \epsilon)$	5
	$2'2'2'$	$(r_8, 2_x^*)(m, \epsilon')(h, \epsilon)$	1
		$(r_8, \epsilon')(m, 2_x^*))(h, \epsilon)$	1
		$(r_8, 2_x^*)(m, 2_x'^*)(h, \epsilon)$	1
	$41'$	$(r_8, 4_z^*)(m, 4_z'^*)(h, \epsilon)$	5
4	$4221'$	$(r_8, 4_z^*)(m, 2_x^\dagger)(h, \epsilon')$	1
		$(r_8, 4_z^*)(m, \epsilon')(h, 2_x^\dagger)$	6
		$(r_8, 2_x^\dagger)(m, 4_z^*)(h, \epsilon')$	5
		$(r_8, \epsilon')(m, 4_z^*)(h, 2_x^\dagger)$	2
		$(r_8, 4_z^*)(m, 4_z'^*)(h, 2_x^\dagger)$	7
		$(r_8, 2_x^\dagger)(m, 2_x'^\dagger)(h, 2_{xy}^{*\dagger})$	3
		$(r_8, 2_{xy}^{*\dagger})(m, 2_x^\dagger)(2_x'^\dagger)$	6
		$(r_8, 2_x^\dagger)(m, 4_z^{*\prime})(h, 2_{xy}^{*\dagger})$	7

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Table C-16: continued

G_ϵ	Γ	generators	*line*
		$(r_8, 4_z^{*\prime})(m, 2_x^\dagger)(h, 2_{xy}^{*\dagger})$	3
$2/m$	$8^*2^\dagger 2^{*\dagger}$	$(r_8, 8_z^*)(m, 2_x^\dagger)(h, \epsilon)$	1
2	$8221'$	$(r_8, 8_z^*)(m, 2_x^\dagger)(h, \epsilon')$	1
$\bar{2}$	$(16)^*2^\dagger 2^{*\dagger}$	$(r_8, 16_z^*)(m, 2_x^\dagger)(h, \epsilon)$	1
		$(r_8, 16_z^{*3})(m, 2_x^\dagger)(h, \epsilon)$	1
1	$(16)221'$	$(r_8, 16_z^*)(m, 2_x^\dagger)(h, \epsilon')$	1
		$(r_8, 16_z^{*3})(m, 2_x^\dagger)(h, \epsilon')$	1
$\Gamma_e = 2'$			
$8/mmm$	$2'$	$(r_8, \epsilon)(m, \epsilon)(h, \epsilon)$	1
$8mm$	$2'2^*2'^*$	$(r_8, \epsilon)(m, \epsilon)(h, 2_x^*)$	1
	$21'$	$(r_8, \epsilon)(m, \epsilon)(h, \epsilon')$	1
822	$2'2^*2'^*$	$(r_8, \epsilon)(m, 2_x^*)(h, 2_x^*)$	1
	$21'$	$(r_8, \epsilon)(m, \epsilon')(h, \epsilon')$	1
$8/m$	$2'2^*2'^*$	$(r_8, \epsilon)(m, 2_x^*)(h, \epsilon)$	1
	$21'$	$(r_8, \epsilon)(m, \epsilon')(h, \epsilon)$	1
$\bar{8}m2$	$2'2^*2'^*$	$(r_8, 2_x^*)(m, \epsilon)(h, 2_x^*)$	1
	$21'$	$(r_8, \epsilon')(m, \epsilon)(h, \epsilon')$	1
$\bar{8}2m$	$2'2^*2'^*$	$(r_8, 2_x^*)(m2_x^*)(h, 2_x^*)$	1
	$21'$	$(r_8, \epsilon')(m, \epsilon')(h, \epsilon')$	1
$4/mmm$	$2'2^*2'^*$	$(r_8, 2_x^*)(m, \epsilon)(h, \epsilon)$	1
	$21'$	$(r_8, \epsilon')(m, \epsilon)(h, \epsilon)$	1
$4/mm'm'$	$2'2^*2'^*$	$(r_8, 2_x^*)(m, 2_x^*)(h, \epsilon)$	1
	$21'$	$(r_8, \epsilon')(m, \epsilon')(h, \epsilon)$	1
8	$2222'2'2'$	$(r_8, \epsilon)(m, 2_x^*)(h, \epsilon')$	1
		$(r_8, \epsilon)(m, \epsilon')(h, 2_x^*)$	1
		$(r_8, \epsilon)(m, 2_x^*)(h, 2_x'^*)$	1
$\bar{8}$	$2'2'2'$	$(r_8, 2_x^*)(m, \epsilon')(h, 2_x^*)$	1
		$(r_8, \epsilon')(m, 2_x^*)(h, \epsilon')$	1
		$(r_8, 2_x^*)(m, 2_x'^*)(h, 2_x^*)$	1
$4mm$	$2'2'2'$	$(r_8, 2_x^*)(m, \epsilon)(h, \epsilon')$	1
		$(r_8, \epsilon')(m, \epsilon)(h, 2_x^*)$	1
		$(r_8, 2_x^*)(m, \epsilon)(h, 2_x'^*)$	1
$4m'm'$	$2'2'2'$	$(r_8, 2_x^*)(m, 2_x^*)(h, \epsilon')$	1
		$(r_8, \epsilon')(m, \epsilon')(h, 2_x^*)$	1
		$(r_8, 2_x^*)(m, 2_x^*)(h, 2_x'^*)$	1
422	$2'2'2'$	$(r_8, 2_x^*)(m, \epsilon')(h, \epsilon')$	1
		$(r_8, \epsilon')(m, 2_x^*)(h, 2_x^*)$	1
		$(r_8, 2_x^*)(m, 2_x'^*)(h, 2_x'^*)$	1
$42'2'$	$2'2'2'$	$(r_8, 2_x^*)(m, \epsilon')(h, 2_x'^*)$	1
		$(r_8, \epsilon')(m, 2_x^*)(h, 2_x'^*)$	1
		$(r_8, 2_x^*)(m, 2_x'^*)(h, \epsilon')$	1
$4/m$	$2'2'2'$	$(r_8, 2_x^*)(m, \epsilon')(h, \epsilon)$	1
		$(r_8, \epsilon')(m, 2_x^*)(h, \epsilon)$	1
		$(r_8, 2_x^*)(m, 2_x'^*)(h, \epsilon)$	1
$\bar{4}$	$4221'$	$(r_8, 4_z^*)(m, 2_x^\dagger)(h, 2_z^-)$	1
$2/m$	$4221'$	$(r_8, 4_z^*)(m, 2_x^\dagger)(h, \epsilon)$	1
$\bar{2}$	$8221'$	$(r_8, 8_z^*)(m, 2_x^\dagger)(h, \epsilon)$	1
$\bar{1}$	$8221'$	$(r_8, 8_z^*)(m, 2_x^\dagger)(h, 2_z^-)$	1
$\Gamma_e = 1'$			
$8/mmm$	$1'$	$(r_8, \epsilon)(m, \epsilon)(h, \epsilon)$	1

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Table C-16: continued

G_ϵ	Γ	generators	*line*
$8mm$	$21'$	$(r_8,\epsilon)(m,\epsilon)(h,2^{-}_{z})$	1
822	$21'$	$(r_8,\epsilon)(m,2^{-}_{z})(h,2^{-}_{z})$	1
$8/m$	$21'$	$(r_8,\epsilon)(m,2^{-}_{z})(h,\epsilon)$	1
$\bar{8}m2$	$21'$	$(r_8,2^{-}_{z})(m,\epsilon)(h,2^{-}_{z})$	1
$\bar{8}2m$	$21'$	$(r_8,2^{-}_{z})(m,2^{-}_{z})(h,2^{-}_{z})$	1
$4/mmm$	$21'$	$(r_8,2^{-}_{z})(m,\epsilon)(h,\epsilon)$	1
$4/mm'm'$	$21'$	$(r_8,2^{-}_{z})(m,2^{-}_{z})(h,\epsilon)$	1
8	$2'2'2'$	$(r_8,\epsilon)(m,2^{-}_{z})(h,2^{-}_{x})$	1
$\bar{8}$	$2'2'2'$	$(r_8,2^{-}_{z})(m,2^{-}_{x})(h,2^{-}_{z})$	1
$4mm$	$2'2'2'$	$(r_8,2^{-}_{z})(m,\epsilon)(h,2^{-}_{x})$	1
$4m'm'$	$2'2'2'$	$(r_8,2^{-}_{z})(m,2^{-}_{z})(h,2^{-}_{x})$	1
422	$2'2'2'$	$(r_8,2^{-}_{z})(m,2^{-}_{x})(h,2^{-}_{x})$	1
$42'2'$	$2'2'2'$	$(r_8,2^{-}_{z})(m,2^{-}_{x})(h,2^{-}_{y})$	1
$4/m$	$2'2'2'$	$(r_8,2^{-}_{z})(m,2^{-}_{x})(h,\epsilon)$	1
$\bar{4}$	$4221'$	$(r_8,4^{-}_{z})(m,2^{-}_{x})(h,2^{-}_{z})$	1
$2/m$	$4221'$	$(r_8,4^{-}_{z})(m,2^{-}_{x})(h,\epsilon)$	1
$\bar{2}$	$8221'$	$(r_8,8^{-}_{z})(m,2^{-}_{x})(h,\epsilon)$	1
		$(r_8,8^{3}_{z})(m,2^{-}_{x})(h,\epsilon)$	1
$\bar{1}$	$8221'$	$(r_8,8^{-}_{z})(m,2^{-}_{x})(h,2^{-}_{z})$	1
		$(r_8,8^{3}_{z})(m,2^{-}_{x})(h,2^{-}_{z})$	1
$\Gamma_e = n$			
$8mm$	$n2^*2^*$	$(r_8,\epsilon)(m,\epsilon)(h,2^{*}_{x})$	9
$\bar{8}2m$	$n2^*2^*$	$(r_8,2^{*}_{x})(m,2^{*}_{x})(h,2^{*}_{x})$	13
8	$n221'$	$(r_8,\epsilon)(m,\epsilon')(h,2^{*}_{x})$	9
	$(2n)^*2^\dagger2^{*\dagger}$	$(r_8,\epsilon)(m,2n^{*}_{z})(h,2^{\dagger}_{x})$	10
$\bar{8}$	$n221'$	$(r_8,2^{*}_{x})(m,2'^{*}_{x})(h,2^{*}_{x})$	13
$4mm$	$n221'$	$(r_8,\epsilon')(m,\epsilon)(h,2^{*}_{x})$	9
	$(2n)^*2^\dagger2^{*\dagger}$	$(r_8,2n^{*}_{z})(m,\epsilon)(h,2^{\dagger}_{x})$	11
$4m'm'$	$n221'$	$(r_8,\epsilon')(m,\epsilon')(h,2^{*}_{x})$	9
		$(r_8,2^{*}_{x})(m,2^{*}_{x})(h,2'^{*}_{x})$	13
	$(2n)^*2^\dagger2^{*\dagger}$	$(r_8,2n^{*}_{z})(m,2n^{*}_{z})(h,2^{\dagger}_{x})$	12
422	$n221'$	$(r_8,2^{*}_{x})(m2'^{*}_{x})(h,2'^{*}_{x})$	13
	$(2n)^*2^\dagger2^{*\dagger}$	$(r_8,2^{\dagger}_{x})(m,(2n^{-}_{z})2^{*\dagger}_{x})(h,(2n^{-}_{z})2^{*\dagger}_{x})$	15
4	$(2n)221'$	$(r_8,2n^{*}_{z})(m,\epsilon')(h,2^{\dagger}_{x})$	11
		$(r_8,\epsilon')(m2n^{*}_{z})(h,2^{\dagger}_{x})$	10
		$(r_8,2n^{*}_{z})(m,2n'^{*}_{z})(h,2^{\dagger}_{x})$	12
		$(r_8,(2n^{-}_{z})2^{\dagger}_{x})(m,2^{*}_{x})(h,2'^{*}_{x})$	14
$\Gamma_e = n'$			
$8mm$	$n'2^*2'^*$	$(r_8,\epsilon)(m,\epsilon)(h,2^{*}_{x})$	9
$\bar{8}2m$	$n'2^*2'^*$	$(r_8,2^{*}_{x})(m,2^{*}_{x})(h,2^{*}_{x})$	13
8	$n221'$	$(r_8,\epsilon)(m,\epsilon')(h,2^{*}_{x})$	9
$\bar{8}$	$n221'$	$(r_8,2^{*}_{x})(m,2'^{*}_{x})(h,2^{*}_{x})$	13
$4mm$	$n221'$	$(r_8,\epsilon')(m,\epsilon)(h,2^{*}_{x})$	9
$4m'm'$	$n221'$	$(r_8,\epsilon')(m,\epsilon')(h,2^{*}_{x})$	9
422	$n221'$	$(r_8,2^{*}_{x})(m,2'^{*}_{x})(h,2'^{*}_{x})$	13
$\Gamma_e = 2^*2^*2$			
	$4^\dagger2^*2^{*\dagger}$	$(r_8,4^{\dagger}_{z})(m,4^{\dagger}_{z})(h,\epsilon)$	8
$4m'm'$	$4221'$	$(r_8,4^{\dagger}_{z})(m,4^{\dagger}_{z})(h,\epsilon')$	8
$42'2'$	$4221'$	$(r_8,4^{\dagger}_{z})(m,4'^{\dagger}_{z})(h,\epsilon')$	8

continued on next page

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Table C-16: continued

G_ϵ	Γ	generators	*line*
$4/m$	$4221'$	$(r_8, 4_z^{\dagger})(m, 4_z'^{\dagger})(h, \epsilon)$	8