International Tables for Crystallography (2010). Vol. B, Figure 4.6.3.25, p. 614.

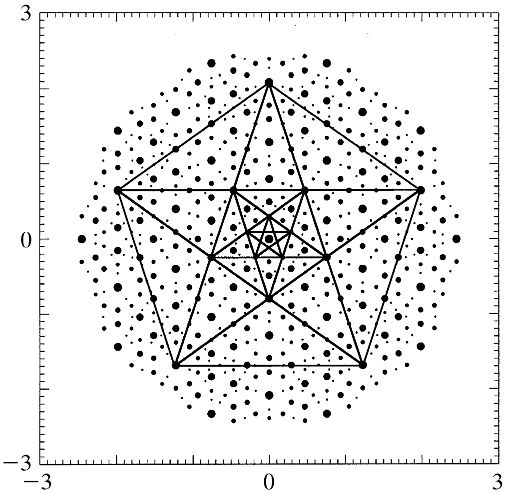

Fig. 4.6.3.24. Pentagrammal relationships between scaling symmetry-related positive structure factors $F(\mathbf{H})$ of the Penrose tiling (edge length a_r = 4.04 Å) in parallel space. The magnitudes of the structure factors are indicated by the diameters of the filled circles.

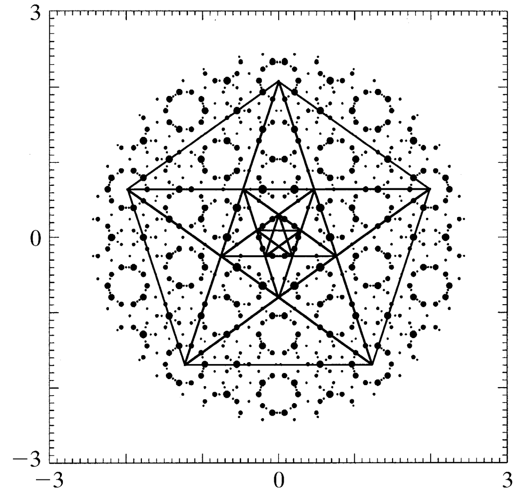

Fig. 4.6.3.25. Pentagrammal relationships between scaling symmetry-related negative structure factors $F(\mathbf{H})$ of the Penrose tiling (edge length a_r = 4.04 Å) in parallel space. The magnitudes of the structure factors are indicated by the diameters of the filled circles.

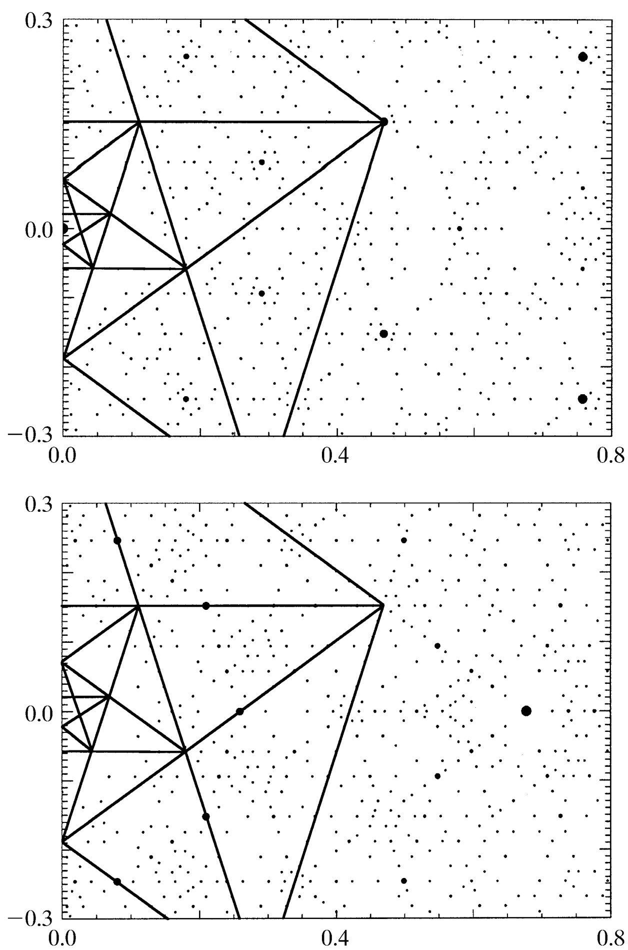

Fig. 4.6.3.26. Pentagrammal relationships between scaling symmetry-related structure factors $F(\mathbf{H})$ of the Penrose tiling (edge length a_r = 4.04 Å) in parallel space. Enlarged sections of Figs. 4.6.3.24 (above) and 4.6.3.25 (below) are shown.

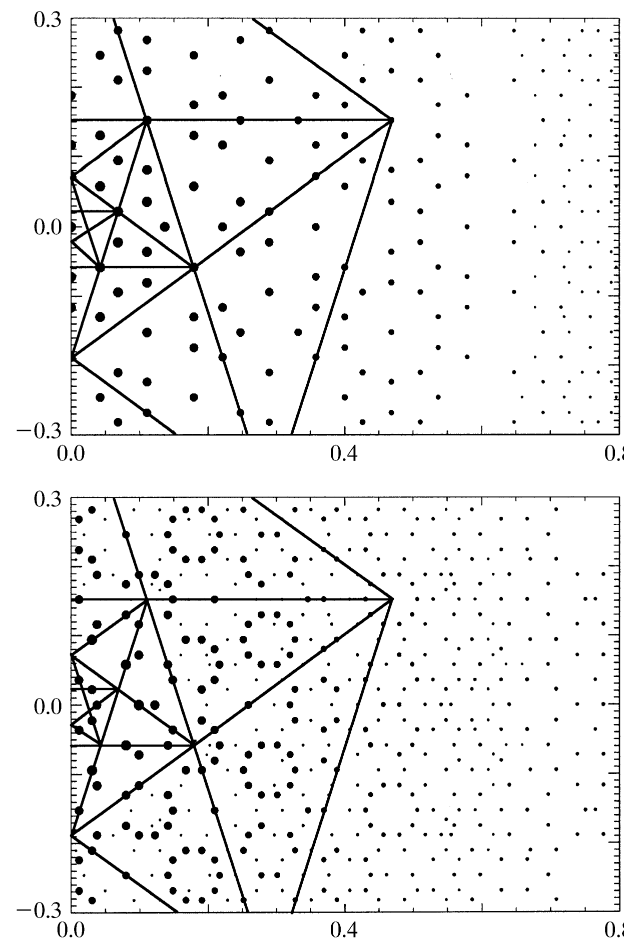

Fig. 4.6.3.27. Pentagrammal relationships between scaling symmetry-related structure factors $F(\mathbf{H})$ of the Penrose tiling (edge length a_r = 4.04 Å) in perpendicular space. Enlarged sections of positive (above) and negative structure factors (below) are shown.

$$\begin{pmatrix} \mathbf{a}_1^* \\ \mathbf{a}_2^* \\ \mathbf{a}_3^* \\ \mathbf{a}_4^* \\ \mathbf{a}_5^* \\ \mathbf{a}_6^* \end{pmatrix} = a^* \begin{pmatrix} 0 & 0 & 1 \\ \sin\theta\cos(4\pi/5) & \sin\theta\sin(4\pi/5) & \cos\theta \\ \sin\theta\cos(6\pi/5) & \sin\theta\sin(6\pi/5) & \cos\theta \\ \sin\theta\cos(8\pi/5) & \sin\theta\sin(8\pi/5) & \cos\theta \\ \sin\theta & 0 & \cos\theta \\ \sin\theta\cos(2\pi/5) & \sin\theta\sin(2\pi/5) & \cos\theta \end{pmatrix} \begin{pmatrix} \mathbf{e}_1^V \\ \mathbf{e}_2^V \\ \mathbf{e}_3^V \end{pmatrix},$$

where $\mathbf{e}_i^V$ are Cartesian basis vectors. Thus, from the number of independent reciprocal-basis vectors needed to index the Bragg reflections with integer numbers, the dimension of the embedding space has to be six. The vector components refer to a Cartesian coordinate system (V basis) in the physical (parallel) space.

The set $M^* = \{\mathbf{H}^\parallel = \sum_{i=1}^{6} h_i \mathbf{a}_i^* | h_i \in \mathbb{Z}\}$ of all diffraction vectors remains invariant under the action of the symmetry operators of the icosahedral point group $K = m\bar{3}\bar{5}$. The symmetry-adapted matrix representations for the point-group generators, one five-

references