Symbols for crystallographic items used in this volume

Direct space: points and vectors

$\mathbb{E}^n$	n-dimensional Euclidean point space
$\mathbb{V}^n$	n-dimensional vector space
$\mathbb{R}$, $\mathbb{Q}$, $\mathbb{Z}$	the field of real numbers, the field of rational numbers, the ring of integers
L	lattice in $\mathbb{V}^3$
L	line in $\mathbb{E}^3$
$\mathbf{a}$, $\mathbf{b}$, $\mathbf{c}$; or $\mathbf{a}_i$	basis vectors of the lattice
a, b, c; or $\lvert\mathbf{a}\rvert$, $\lvert\mathbf{b}\rvert$, $\lvert\mathbf{c}\rvert$	lengths of basis vectors, lengths of cell edges (lattice parameters)
α, β, γ; or α_j	interaxial angles $\angle(\mathbf{b}, \mathbf{c})$, $\angle(\mathbf{c}, \mathbf{a})$, $\angle(\mathbf{a}, \mathbf{b})$ (lattice parameters)
$\boldsymbol{G}$, g_{ik}	fundamental matrix (metric tensor) and its coefficients
V	cell volume
X, Y, Z, P	points
$\mathbf{r}$, $\mathbf{d}$, $\mathbf{x}$, $\mathbf{v}$, $\mathbf{u}$	vectors, position vectors
r, $\lvert\mathbf{r}\rvert$	norm, length of a vector
$\mathbf{x} = x\mathbf{a} + y\mathbf{b} + z\mathbf{c}$	vector with coefficients x, y, z
x, y, z; or x_i	point coordinates expressed in units of a, b, c; coefficients of a vector
$\boldsymbol{x} = \begin{pmatrix} x \\ y \\ z \end{pmatrix} \equiv \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix}$	column of point coordinates or vector coefficients
$\mathbf{t}$	translation vector
t_1, t_2, t_3; or t_i	coefficients of translation vector $\mathbf{t}$
$\boldsymbol{t} = \begin{pmatrix} t_1 \\ t_2 \\ t_3 \end{pmatrix}$	column of coefficients of translation vector $\mathbf{t}$
O	origin
$\mathbf{o}$	zero vector (all coefficients zero)
$\boldsymbol{o}$	(3×1) column of zero coefficients
$\mathbf{a}'$, $\mathbf{b}'$, $\mathbf{c}'$; or $\mathbf{a}'_i$	new basis vectors after a transformation of the coordinate system (basis transformation)
$\mathbf{r}'$; or $\mathbf{x}'$; x', y', z'; or x'_i	vector and point coordinates after a transformation of the coordinate system (basis transformation)
$\boldsymbol{x}' = \begin{pmatrix} x' \\ y' \\ z' \end{pmatrix}$	column of coordinates after a transformation of the coordinate system (basis transformation)
$\tilde{X}$	image of a point X after the action of a symmetry operation
$\tilde{x}$, $\tilde{y}$, $\tilde{z}$; or $\tilde{x}_i$	coordinates of an image point $\tilde{X}$
$\tilde{\boldsymbol{x}} = \begin{pmatrix} \tilde{x} \\ \tilde{y} \\ \tilde{z} \end{pmatrix}$	column of coordinates of an image point $\tilde{X}$
$\mathbb{x}$, or $\mathbb{r}$	$(3 + 1) \times 1$ 'augmented' columns of point coordinates or vector coefficients

Directions and planes

$[uvw]$	indices of a lattice direction (zone axis)
$\langle uvw\rangle$	indices of a set of all symmetry-equivalent lattice directions
(hkl)	indices of a crystal face, or of a single net plane (Miller indices)
$(hkil)$	indices of a crystal face, or of a single net plane, for the hexagonal axes $\mathbf{a}_1$, $\mathbf{a}_2$, $\mathbf{a}_3$, $\mathbf{c}$ (Bravais–Miller indices)
$\{hkl\}$	indices of a set of all symmetry-equivalent crystal faces ('crystal form'), or net planes
$\{hkil\}$	indices of a set of all symmetry-equivalent crystal faces ('crystal form'), or net planes, for the hexagonal axes $\mathbf{a}_1$, $\mathbf{a}_2$, $\mathbf{a}_3$, $\mathbf{c}$
hkl	indices of the Bragg reflection (Laue indices) from the set of parallel equidistant net planes (hkl)
d_{hkl}	interplanar distance, or spacing, of neighbouring net planes (hkl)

Reciprocal space

$\mathbf{L}^*$	reciprocal lattice
$\mathbf{a}^*$, $\mathbf{b}^*$, $\mathbf{c}^*$; or $\mathbf{a}^*_i$	basis vectors of the reciprocal lattice
a^*, b^*, c^*; or $\lvert\mathbf{a}^*\rvert$, $\lvert\mathbf{b}^*\rvert$, $\lvert\mathbf{c}^*\rvert$	lengths of basis vectors of the reciprocal lattice
α^*, β^*, γ^*; or α^*_j	interaxial angles $\angle(\mathbf{b}^*, \mathbf{c}^*)$, $\angle(\mathbf{c}^*, \mathbf{a}^*)$, $\angle(\mathbf{a}^*, \mathbf{b}^*)$ of the reciprocal lattice
$\mathbf{r}^*$, or $\mathbf{h}$	vector in reciprocal space, or vector of reciprocal lattice
r^*, or $\lvert\mathbf{r}^*\rvert$	length of a vector in reciprocal space
h, k, l; or h_i	coefficients of a reciprocal-lattice vector
$\boldsymbol{h} = (h, k, l)$	(1×3) row of coefficients of a reciprocal-lattice vector
V^*	cell volume of the reciprocal lattice
$\boldsymbol{G}^*$, g^*_{ik}	fundamental matrix (metric tensor) of the reciprocal lattice and its coefficients

Functions

$\rho(xyz)$	electron density at the point x, y, z
$P(uvw)$	Patterson function for a vector with coefficients u, v, w
$F(hkl)$, or F	structure factor (of the unit cell) corresponding to the Bragg reflection hkl
$\lvert F(hkl)\rvert$, or $\lvert F\rvert$	modulus of the structure factor $F(hkl)$
$\alpha(hkl)$, or α	phase angle of the structure factor $F(hkl)$

Mappings, symmetry operations and their matrix–column presentation

$\boldsymbol{A}$, $\boldsymbol{B}$, $\boldsymbol{W}$	(3×3) matrices describing the linear part of a mapping
A_{ik}, W_{ik}	matrix coefficients
$\boldsymbol{I}$	(3×3) unit matrix
$\boldsymbol{A}^{\mathrm{T}}$	matrix $\boldsymbol{A}$ transposed
$\det(\boldsymbol{A})$, $\mathrm{tr}(\boldsymbol{A})$	determinant of matrix $\boldsymbol{A}$, trace of matrix $\boldsymbol{A}$
$\boldsymbol{w} = \begin{pmatrix} w_1 \\ w_2 \\ w_3 \end{pmatrix}$	(3×1) column of coefficients w_i describing the translation part of a mapping
$\boldsymbol{w}_g$	intrinsic translation part of a symmetry operation
$\boldsymbol{w}_l$	location translation part of a symmetry operation
A, I, W	mappings, symmetry operations
t	translation symmetry operation
$(\boldsymbol{W}, \boldsymbol{w})$	matrix–column pair of a symmetry operation given by a (3×3) matrix $\boldsymbol{W}$ and a (3×1) column $\boldsymbol{w}$
$(\boldsymbol{I}, \boldsymbol{t})$	matrix–column pair of a translation
$(\boldsymbol{I}, \boldsymbol{o})$	matrix–column pair of the identity
$(\boldsymbol{P}, \boldsymbol{p})$	transformation of the coordinate system, described by a (3×3) matrix $\boldsymbol{P}$ and a (3×1) column $\boldsymbol{p}$
$(\boldsymbol{Q}, \boldsymbol{q})$	inverse transformation of $(\boldsymbol{P}, \boldsymbol{p})$: $(\boldsymbol{Q}, \boldsymbol{q}) = (\boldsymbol{P}, \boldsymbol{p})^{-1}$
$\mathbb{W}$	symmetry operation W, described by a $(3 + 1) \times (3 + 1)$ 'augmented' matrix
$\mathbb{P}$	transformation of the coordinate system, described by a $(3 + 1) \times (3 + 1)$ 'augmented' matrix
$\mathbb{Q}$	inverse transformation of $\mathbb{P}$: $\mathbb{Q} = \mathbb{P}^{-1}$
$\{\boldsymbol{R}\|\boldsymbol{v}\}$	Seitz symbol of a symmetry operation

Groups

$\mathcal{G}$	group, space group
$\mathcal{H}, \mathcal{U}$	subgroups
$\mathcal{I}$	trivial group, consisting of the unit element e only
$\mathcal{P}, \mathcal{S}, \mathcal{F}, \mathcal{D}, \mathcal{R}$	groups
$\|\mathcal{G}\|$	order of the group $\mathcal{G}$
i, or $[i]$	index of a subgroup in a group
$\mathcal{T}$, or $\mathcal{T}_{\mathcal{G}}$	group of all translations of a space group, or of the space group $\mathcal{G}$
$\mathcal{P}$, or $\mathcal{P}_{\mathcal{G}}$	point group of a space group, or of the space group $\mathcal{G}$
$\mathcal{M}$	Hermann's group
$\mathcal{A}$	group of all affine mappings (affine group)
$\mathcal{E}$	group of all isometries (motions) (Euclidean group)
$\mathcal{E}^+$	group of chirality-preserving isometries
φ, $ker(\varphi)$	homomorphic mapping (homomorphism), kernel of homomorphism φ
$\mathcal{G}/\mathcal{H}$	factor group or quotient group of $\mathcal{G}$ by $\mathcal{H}$
$\mathcal{N}_{\mathcal{G}}(\mathcal{H})$	normalizer of $\mathcal{H}$ in $\mathcal{G}$
$\mathcal{N}_{\mathcal{E}}(\mathcal{G})$, or $\mathcal{N}_{\mathcal{E}^+}(\mathcal{G})$	Euclidean or chirality-preserving Euclidean normalizer of the space group $\mathcal{G}$
$\mathcal{N}_{\mathcal{A}}(\mathcal{G})$	affine normalizer of $\mathcal{G}$
$\mathcal{G}(\omega)$	orbit of ω under the group $\mathcal{G}$
$\mathcal{S}_{\mathcal{G}}(\omega)$, $\mathcal{S}_{\mathcal{H}}(\omega)$	stabilizer of ω in the group $\mathcal{G}$, or $\mathcal{H}$
$\mathcal{O} = \mathcal{G}(X)$	orbit of point X under the group $\mathcal{G}$
$\mathcal{S}_X = \mathcal{S}_{\mathcal{G}}(X)$	site-symmetry group of point X
$\mathscr{E}$	eigensymmetry group of an orbit $\mathcal{O}$
a, b, g, h, m, t	group elements
e	unit element of a group
t	element of the translation group $\mathcal{T}$