210, 243–254. We are indebted to R. Oldenbourg Verlag, Munich, Germany, for allowing us to reprint parts of this article.

APPENDIX A1.5.1
Reciprocal-space groups $(\mathcal{G})^*$

This table is based on Table 1 of Wintgen (1941).

In order to obtain the Hermann–Mauguin symbol of $(\mathcal{G})^*$ from that of $\mathcal{G}$, one replaces any screw rotations by rotations and any glide reflections by reflections. The result is the symmorphic space group $\mathcal{G}_0(\mathcal{G})$. For most space groups $\mathcal{G}$, the reciprocal-space group $(\mathcal{G})^*$ is isomorphic to $\mathcal{G}_0(\mathcal{G})$, *i.e.* $\mathcal{G}_0(\mathcal{G})$ and $(\mathcal{G})^*$ belong to the same arithmetic crystal class. In the following cases $(\mathcal{G})^*$ is isomorphic to a symmorphic space group $\mathcal{G}_0$ which is different from $\mathcal{G}_0(\mathcal{G})$. Thus the arithmetic crystal classes of $\mathcal{G}$ and $(\mathcal{G})^*$ are different, *i.e.* $(\mathcal{G})^*$ can not be obtained in this simple way:

(1) If the lattice symbol of $\mathcal{G}$ is *F* or *I*, it has to be replaced by *I* or *F*, *e.g.* $(\mathcal{G})^*$ is isomorphic to *Imm*2 for the arithmetic crystal class $\mathcal{G} = mm2F$. The tetragonal space groups form an exception to this rule; for these the symbol *I* persists.

(2) The other exceptions are listed in the following table (for the symbols of the arithmetic crystal classes see *IT* A, Section 8.2.3):

Arithmetic crystal class of $\mathcal{G}$	Reciprocal-space group $(\mathcal{G})^*$
$\bar{4}m2I$	$I\bar{4}2m$
$\bar{4}2mI$	$I\bar{4}m2$
$321P$	$P312$
$312P$	$P321$
$3m1P$	$P31m$
$31mP$	$P3m1$
$\bar{3}1mP$	$P\bar{3}m1$
$\bar{3}m1P$	$P\bar{3}1m$
$\bar{6}m2P$	$P\bar{6}2m$
$\bar{6}2mP$	$P\bar{6}m2$

References

Altmann, S. L. (1977). *Induced Representations in Crystals and Molecules.* London: Academic Press.

Aroyo, M. I., Kirov, A., Capillas, C., Perez-Mato, J. M. & Wondratschek, H. (2006). *Bilbao Crystallographic Server. II. Representations of crystallographic point groups and space groups. Acta Cryst.* A**62**, 115–128.

Aroyo, M. I., Perez-Mato, J. M., Capillas, C., Kroumova, E., Ivantchev, S., Madariaga, G., Kirov, A. & Wondratschek, H. (2006). *Bilbao Crystallographic Server: I. Databases and crystallographic computing programs. Z. Kristallogr.* **221**, 15–27.

Aroyo, M. I. & Wondratschek, H. (1995). *Crystallographic viewpoints in the classification of space-group representations. Z. Kristallogr.* **210**, 243–254.

Bilbao Crystallographic Server (1998). http://www.cryst.ehu.es/.

Bouckaert, L. P., Smoluchowski, R. & Wigner, E. P. (1936). *Theory of Brillouin zones and symmetry properties of wave functions in crystals. Phys. Rev.* **50**, 58–67.

Boyle, L. L. (1986). *The classification of space group representations.* In *Proceedings of the 14th International Colloquium on Group-Theoretical Methods in Physics*, pp. 405–408. Singapore: World Scientific.

Bradley, C. J. & Cracknell, A. P. (1972). *The Mathematical Theory of Symmetry in Solids: Representation Theory for Point Groups and Space Groups.* Oxford: Clarendon Press.

Cracknell, A. P., Davies, B. L., Miller, S. C. & Love, W. F. (1979). *Kronecker Product Tables*, Vol. 1, *General Introduction and Tables of Irreducible Representations of Space Groups.* New York: IFI/Plenum.

Davies, B. L. & Cracknell, A. P. (1976). *Some comments on and addenda to the tables of irreducible representations of the classical space groups published by S. C. Miller and W. F. Love. Acta Cryst.* A**32**, 901–903.

Davies, B. L. & Dirl, R. (1987). *Various classification schemes for irreducible space group representations.* In *Proceedings of the 15th International Colloquium on Group-Theoretical Methods in Physics*, edited by R. Gilmore, pp. 728–733. Singapore: World Scientific.

Delaunay, B. (1933*a*). *Neue Darstellung der geometrischen Kristallographie. Z. Kristallogr.* **84**, 109–149.

Delaunay, B. (1933*b*). *Berichtigung zur Arbeit "Neue Darstellung der geometrischen Kristallographie". Z. Kristallogr.* **85**, 332.

International Tables for Crystallography (2005). Vol. A, *Space-Group Symmetry*, edited by Th. Hahn, 5th ed. Heidelberg: Springer.

Jan, J.-P. (1972). *Space groups for Fermi surfaces. Can. J. Phys.* **50**, 925–927.

Jansen, L. & Boon, M. (1967). *Theory of Finite Groups. Applications in Physics: Symmetry Groups of Quantum Mechanical Systems.* Amsterdam: North-Holland.

Janssen, T. (2003). *International Tables for Crystallography*, Vol. D, *Physical Properties of Crystals*, edited by A. Authier, ch. 1.2, *Representations of crystallographic groups.* Dordrecht: Kluwer Academic Publishers.

Kovalev, O. V. (1986). *Irreducible and Induced Representations and Co-representations of Fedorov Groups.* Moscow: Nauka.

Lomont, J. S. (1959). *Applications of Finite Groups.* New York: Academic Press.

Miller, S. C. & Love, W. F. (1967). *Tables of Irreducible Representations of Space Groups and Co-representations of Magnetic Space Groups.* Boulder: Pruett Press.

Raghavacharyulu, I. V. V. (1961). *Representations of space groups. Can. J. Phys.* **39**, 830–840.

Rosen, J. (1981). *Resource letter SP-2: Symmetry and group theory in physics. Am. J. Phys.* **49**, 304–319.

Slater, L. S. (1962). *Quantum Theory of Molecules and Solids*, Vol. 2. Amsterdam: McGraw-Hill.

Smith, J. V. (1982). *Geometrical and Structural Crystallography*. New York: John Wiley & Sons.

Stokes, H. T. & Hatch, D. M. (1988). *Isotropy Subgroups of the 230 Crystallographic Space Groups.* Singapore: World Scientific.

Stokes, H. T., Hatch, D. M. & Nelson, H. M. (1993). *Landau, Lifshitz, and weak Lifshitz conditions in the Landau theory of phase transitions in solids. Phys. Rev. B*, **47**, 9080–9083.

Wintgen, G. (1941). *Zur Darstellungstheorie der Raumgruppen. Math. Ann.* **118**, 195–215.

Zak, J., Casher, A., Glück, M. & Gur, Y. (1969). *The Irreducible Representations of Space Groups.* New York: Benjamin.