Hence, several books on quasicrystals have appeared in the interim (see Appendix) and chapters on quasicrystals have been introduced into new books on solid state physics and into new editions of existing monographs. However, most of the former have been written for scientists specialised in this field rather than for students, and the latter additions are often rather brief. We therefore decided to fill the gap between these two extremes with a book which provides an introduction to the structure and physical properties of quasicrystals and covers, in sufficient detail, all important field. The discretely diffracting aperiodic crystals termed quasicrystals, discovered at NBS in the early 1980s, have led to much interdisciplinary activity involving mainly materials science, physics, mathematics, and crystallography. It led to a new understanding of how atoms can arrange themselves, the role of periodicity in nature, and has created a new branch of crystallography. The phase problem is very well-known in crystallography and is particularly important for structure solution of quasicrystals. Structure solution (initial phasing of the diffraction pattern) is the first step of atomic structure determination against the diffraction data. Many tools for solving the phase problem in crystallography were developed over the years.