
Preface

The quasicrystal community comprises mathematicians, physicists, chemists, materials scientists, and a handful of crystallographers. This diversity is reflected in more than 10,000 publications reporting 25 years of quasicrystal research. Always missing has been a monograph on the “Crystallography of Quasicrystals,” a book presenting the main concepts, methods and structures in a self-consistent unified way; a book that translates the terminology and way of thinking of all these specialists from different fields into that of crystallographers, in order to look at detailed problems as well as at the big picture from a structural point of view.

Once Albert Einstein pointed out: “As far as the laws of mathematics refer to reality, they are not certain; as far as they are certain, they do not refer to reality.” Accordingly, this book is aimed at bridging the gap between the ideal mathematical and physical constructs and the real quasicrystals of intricate complexity, and, last but not the least, providing a toolbox for tackling the structure analysis of real quasicrystals.

The book consists of three parts. The part “Concepts” treats the properties of tilings and coverings. If decorated by polyhedral clusters, these can be used as models for quasiperiodic structures. The higher-dimensional approach, central to the crystallography of quasicrystals, is also in the center of this part.

The part “Methods” discusses experimental techniques for the study of real quasicrystals as well as power and limits of methods for their structural analysis. What can we know about a quasicrystal structure and what do we want to know, why, and what for, this is the guideline.

The part “Structures” presents examples of quasicrystal structures, followed by a discussion of phase stability and transformations from a microscopical point of view. It ends with a chapter on soft quasicrystals and artificially fabricated macroscopic structures that can be used as photonic or phononic quasicrystals.

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This book is intended for researchers in the field of quasicrystals and all scientists and graduate students who are interested in the crystallography of quasicrystals.

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Crystallography of Quasicrystals
Concepts, Methods and Structures

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