

Contents

Preface	xi
Similarity Submodules and Semigroups	
MICHAEL BAAKE and ROBERT V. MOODY	1
1 Introduction	1
2 Definitions and preliminaries	2
3 Examples in one dimension	3
4 Examples in two dimensions	5
5 Examples in three dimensions	7
Pisot-Cyclotomic Quasilattices and Their Symmetry Semigroups	
DAMIEN BARACHE, BERNARD CHAMPAGNE and JEAN-PIERRE GAZEAU	15
1 Introduction	15
2 The concept of a quasilattice in \mathbb{R}^d	18
3 How to get quasilattices: Windows in conjugate spaces	22
4 How to get quasilattices: Projection from root lattices	26
5 Symmetry semigroups for quasilattices	39
6 Quasilattices based on sets of β -integers	46
7 How to get quasilattices: 3D icosahedral quasilattices	54
Appendix A Roots of unity and cyclotomic numbers	60
Appendix B Proof of the Proposition 3.1	63
Three Possible Branches of Determinate Modular Generalization of Crystallography	
N. A. BULIENKOV	67
1 Introduction	67
2 Modules of three-dimensional structures of crystals and of generalized crystallography	71
3 Tetrahedral determinate structures for spaces with opposite signs of curvature	73
4 The modular model of an icosahedral quasicrystal	88
5 Modular hierarchical pentagonal mosaics	104
6 Conclusions	129

Non-Crystallographic Root Systems	135
LIANG CHEN, ROBERT V. MOODY and JIŘÍ PATERA	
1 Introduction, review of finite root systems	135
2 $\mathbb{Z}[\tau]$ -lattices	140
3 Wythoff polytopes	142
4 Root systems of types H_2, H_3, H_4	143
5 H_k -invariant lattices	151
6 Star maps	152
7 Meyer sets and quasicrystals	159
8 Amenability and growth	162
9 Examples of amenable regions	166
10 Inflation, quasiaddition, and generation of quasicrystals	172
 Upper Bounds for the Lengths of Bridges Based on Delone Sets	179
LUDWIG DANZER	
1 Introduction	179
2 Definitions and preliminaries	179
3 Results	183
4 Proofs	184
5 Tables	190
 The Local Theorem for Tilings	193
NIKOLAI DOLBILIN and DORIS SCHATTSCHNEIDER	
1 Preliminaries	194
2 The Theorem	196
 Uniform Distribution and the Projection Method	201
A. HOF	
1 Introduction	201
2 Definitions and notation	202
3 Ergodicity	203
4 Application to the projection method	204
5 Generalization	205
 One Corona is enough for the Euclidean Plane	207
DORIS SCHATTSCHNEIDER and NIKOLAI DOLBILIN	
1 Preliminaries	208
2 The one-corona theorem for polygonal tilings	210
3 The Escher problem	236
4 Catalog of Monohedral Tilings	237

Cut-and-Project Sets in Locally Compact Abelian Groups	247
MARTIN SCHLOTTMANN	
1 Introduction	247
2 Density of cut-and-project sets	248
3 Proof of Proposition 2.1	250
4 The general density formula	253
5 Regular cut-and-project sets	255
6 Existence of standard projection strips	258
7 Local uniqueness of standard projection strips	260
8 Conclusion	262
Appendix Topological Abelian Groups	263
 Spectrum of Dynamical Systems Arising from Delone Sets	 265
BORIS SOLOMYAK	
1 Introduction	265
2 Delone sets	266
3 Abstract dynamical systems	269
4 Continuous eigenfunctions	270
5 Pure discrete spectrum	271
 Non-Locality and Aperiodicity of d-Dimensional Tilings	 277
GERRIT van OPHUYSEN	
1 Introduction	277
2 Cluster, tiling and species	278
3 Global aspects	279
4 Non-locality	282
5 Consequences of locality	283
6 Results and discussion	287
 Index	 289