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Titolo	Complex quantum systems : analysis of large Coulomb systems / / editor: Heinz Siedentop
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Descrizione fisica	1 online resource (303 pages)
Collana	Lecture notes series, , 1793-0758 ; ; v. 24
Altri autori (Persone)	SiedentopHeinz
Disciplina	530.12
Soggetti	Quantum statistics Quantum electrodynamics - Mathematics
Lingua di pubblicazione	Inglese
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Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	Intro -- CONTENTS -- Foreword -- Preface -- Stability of Matter Rafael D. Benguria and Benjamn A. Loewe -- 1. Introduction: The stability of quantum systems: A historical overview -- 2. Stability of Matter: The classical proof of Lieb and Thirring -- 2.1. Stability of the hydrogen atom in non-relativistic quantum mechanics -- 2.2. Stability of a system of N electrons in non-relativistic quantum mechanics -- 2.3. Stability of a many particle system via Thomas-Fermi theory -- 2.4. Bibliographical remarks -- 3. Lieb-Thirring Inequalities -- 3.1. Use of commutation methods to prove the Lieb-Thirring inequality for = 3/2 in dimension 1 -- 3.2. The Eden-Foias bound ([46]) -- 3.3. Bibliographical remarks -- 4. Electrostatic Inequalities -- 5. The Maximum Number of Electrons an Atom Can Bind -- 5.1. The maximum number of electrons for a one center case in the Thomas-Fermi model -- 5.2. Bound on Nc(Z) for the TFW model in the atomic case -- 6. The Stability of Matter for a Relativistic Toy Model -- 6.1. Bibliographical remarks -- 7. A New Lieb-Oxford Bound with Gradient Corrections -- Acknowledgments -- Appendix: A Short History of the Atom -- References -- Mathematical Density and Density Matrix

Sommario/riassunto

This volume is based on lectures given during the program Complex Quantum Systems held at the National University of Singapore's Institute for Mathematical Sciences from 17 February to 27 March 2010. It guides the reader through two introductory expositions on large Coulomb systems to five of the most important developments in the field: derivation of mean field equations, derivation of effective Hamiltonians, alternative high precision methods in quantum chemistry, modern many body methods originating from quantum information, and - the most complex - semirelativistic quantum electrodynamics.

2. Record Nr. UNINA9910970740003321

Titolo	The Algorithmic Beauty of Plants / / by Przemyslaw Prusinkiewicz, Aristid Lindenmayer
Pubbl/distr/stampa	New York, NY : , : Springer New York : , : Imprint : Springer, , 1990
ISBN	1-4613-8476-1
Edizione	[1st ed. 1990.]
Descrizione fisica	1 online resource (XII, 228 pages) : 14 illustrations
Collana	The Virtual Laboratory
Disciplina	004
Soggetti	Computer science Mathematics Botany Computer Science Plant Science
Lingua di pubblicazione	Inglese
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Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	1 Graphical modeling using L-systems -- 1.1 Rewriting systems -- 1.2 DOL-systems -- 1.3 Turtle interpretation of strings -- 1.4 Synthesis of DOL-systems -- 1.5 Modeling in three dimensions -- 1.6 Branching structures -- 1.7 Stochastic L-systems -- 1.8 Context-sensitive L-systems -- 1.9 Growth functions -- 2 Modeling of trees -- 3 Developmental models of herbaceous plants -- 3.1 Levels of model specification -- 3.2 Branching patterns -- 3.3 Models of inflorescences -- 4 Phyllotaxis -- 4.1 The planar model -- 4.2 The cylindrical model -- 5 Models of plant organs -- 5.1 Predefined surfaces -- 5.2 Developmental surface models -- 5.3 Models of compound leaves -- 6 Animation of plant development -- 6.1 Timed DOL-systems -- 6.2 Selection of growth functions -- 7 Modeling of cellular layers -- 7.1 Map L-systems -- 7.2 Graphical interpretation of maps -- 7.3 Microsorium linguaeforme -- 7.4 Dryopteris thelypteris -- 7.5 Modeling spherical cell layers -- 7.6 Modeling 3D cellular structures -- 8 Fractal properties of plants -- 8.1 Symmetry and self-similarity -- 8.2 Plant models and iterated function systems -- Epilogue -- Appendix A Software environment for plant modeling -- A.1 A virtual laboratory in botany -- A.2 List of laboratory programs -- Appendix B

About the figures -- Turtle interpretation of symbols.

Sommario/riassunto

The beauty of plants has attracted the attention of mathematicians for Mathematics centuries. Conspicuous geometric features such as the bilateral sym- and beauty metry of leaves, the rotational symmetry of flowers, and the helical arrangements of scales in pine cones have been studied most exten- sively. This focus is reflected in a quotation from Weyl [159, page 3], "Beauty is bound up with symmetry. " This book explores two other factors that organize plant structures and therefore contribute to their beauty. The first is the elegance and relative simplicity of developmental algorithms, that is, the rules which describe plant development in time. The second is self-similarity, char- acterized by Mandelbrot [95, page 34] as follows: When each piece of a shape is geometrically similar to the whole, both the shape and the cascade that generate it are called self-similar. This corresponds with the biological phenomenon described by Herman, Lindenmayer and Rozenberg [61]: In many growthprocesses of living organisms, especially of plants, regularly repeated appearances of certain multicel- lular structures are readily noticeable. . . . In the case of a compound leaf, for instance, some of the lobes (or leaflets), which are parts of a leaf at an advanced stage, have the same shape as the whole leaf has at an earlier stage. Thus, self-similarity in plants is a result of developmental processes. Growth and By emphasizing the relationship between growth and form, this book form follows a long tradition in biology.