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BOOK REVIEWS

Audin, M., Cannas da Silva, A. and Lerman, E. – *Symplectic Geometry of Integrable Hamiltonian Systems*, Birkhäuser (Advanced Courses in Mathematics, CRM, Barcelona) 2003, Paperback, 225 pp., ISBN 3-7643-2167-9.

The *integrable* Hamiltonian systems are among the most interesting systems of differential equations, both for mathematicians and physicists. Even if we are not always able to write down their solutions in finite terms, we do know a lot about these solutions. In particular, what is important for this book (based on the lecture notes delivered by the authors, three of the most active researchers in the field, worldwide) at the Euro Summer School *Symplectic Geometry of Integrable Hamiltonian Systems*, held at the Centre de Recerca Matemàtica (Barcelona, Spain), between July 10 and July 15, 2001, is the fact that the solution are *quasi-periodic*. This property is related to the fact that the corresponding Hamiltonian systems are invariant under a (semi-global) torus action. This is way one of the central topics of this book is related, exactly to those symplectic manifolds that can be endowed with a global torus action (in other words, the so-called *symplectic toric manifolds*).

The book, as expected, has three parts. The first one, written by Michèle Audin, deals with the so-called *Special Lagrangian submanifolds* of a symplectic manifold. It is known that for an ordinary Lagrangian submanifold, the Gauss map takes values in the so-called Lagrangian Grassmannian. The special Lagrangian submanifolds are those for which this map takes values in a submanifold of the Lagrangian Grassmanian, obtained as the quotient of the special unitary group by the special orthogonal group. It turns out that these particular classes of Lagrangian submanifolds play an important role, also, in theoretical physics (for instance in the investigation of the Calabi-Yau manifolds or for the study of mirror symmetry).

The second part of the book (written by Ana Cannas da Silva), is concerned, as suggested, with the theory of *symplectic toric manifolds*. The first half is devoted to to the study of toric manifolds with the tools of symplectic geometry, including, in particular, the study of the reduced spaces and the geometry of the moment map and of the image of this map (the so-called *moment polytope*). The second half describe the toric manifold in an algebraic language, realizing them as a special class of projective varieties and making, also, investigation related to the classification of toric varieties and the geometry of the moment polytopes.

Finally, the last part of the book, belonging to Eugene Lerman, describes an analogue of the symplectic toric manifolds in the *contact* category, the so-called *contact toric manifolds*, which are, basically, just contact manifolds endowed with a torus action which is compatible with the contact structure.

The prerequisites for this book are not so many. For most of it, a serious course in smooth manifolds should be enough. Sometimes, knowledge from algebraic geometry is used, but everything is described in the book, which makes it quite self-consistent. It includes a lot of exercises an worked examples, which makes appropriate for both graduate courses and self-study. Even the experts in the field will find many new results or original approaches to some classical results.

The book is highly recommended for everyone interested in the latest geometrical approaches to the theory of integrable Hamiltonian systems.

Paul A. Blaga

Audin, M., *Torus Actions on Symplectic Manifolds* (revised edition), Birkhäuser (Progress in Mathematics, 93) 2004, Hardcover, 325 pp., ISBN 3-7643-2176-8.

This a second edition of a classical book on symplectic geometry. The first edition was published in 1989 (in the same series, under the same order number) and it is probably well-known to anyone with a serious interest in the field.

I will describe, first the current edition of the book and then I will say afew words about the differences between the two editions.

The first three chapters of the book contain the basic material about symplectic manifolds and symplectic actions on Lie groups (including momentum mappings, torus actions and integrable systems).

Chapter IV, one of the most important of the book, comprises applications of the Morse theory to Hamiltonian systems, including, among other things, the well-known convexity theorems.

The next chapter is devoted to families of symplectic manifolds endowed with flat connections (moduli spaces of flat connections), while chapter VI is concerned with the very important topic of equivariant cohomology and *symplectic localization*. It is proven here, among others, the well-known Duistermaat-Heckman localization theorem. In the chapter VII there is presented a topological construction of the complex toric varieties, based on the works of Delzant, Danilov and Kirwan.

Finally, in the last chapter the author discusses the circle actions on symplectic four-dimensional manifolds.

Each chapters end with a carefully chosen list of exercises.

It would be impossible to list here all the differences from the first edition. It goes without saying, the book is written more carefully and some missprints have been eliminated. The chapter of moduli of flat connections is entirely new, but the other chapters have been, also, completed and/or restructured, including many results discovered in the last 15 years. Unlike the first edition, this one, also includes an index and, of course, the bibliography has been updated.

To make a long story short, if there were serious reasons for the first edition to become a classic, there are even more for the second one. This book, clearly, is a must have for any "symplectician" from graduate student to expert.

Paul A. Blaga

Bouwknegt, P., Yu, S. (Eds.), *Geometric Analysis and Applications to Quantum Field Theory*, Birkhäuser (Progress in Mathematics, 205) 2002, Hardcover, 203 pp., ISBN 3-8176-4287-0.

"Geometric Analysis" is a term that covers many different fields of mathematics and it is hard to give it a proper definition nowadays. It comprises, that's for sure, a number of methods that lie at the interface between geometry and analysis, such as operator theory on manifolds (smooth or with singularities), geometric methods in functional analysis and many others.

The book under review, based on a summer school and a workshop held in 1998 and 1999, respectively, at the Institute for Geometry an its Applications from Adelaide (Australia) surveys some of its methods, having in mind the applications to modern quantum field theory.

The seven chapter of the book, based, as I said before, on the lectures given at the two events, deal, in order, with: semiclassical approximation in Chern-Simons gauge theory, the Knizhnik-Zamolodchkov equation, loop groups and quantum fields, applications of variational calculus in Hermitian Geometry, monopoles, Gromov-Witten invariants and quantum cohomology and the geometry and physics of the Seiberg-Witten equations.

The intended audience of the lectures included graduate students in mathematics and physics. This applies, of course, to the book, as well. Generally speaking, the topics have been carefully selected among those which are at the very frontier of research and for which no up to date monograph was available. Therefore, the book can be very useful, also, for researchers wanting to have a rapid introduction to a domains which are not necessary their owns. Adding that the contributions are very well written, in a pedagogical manner, and that the authors are, all of them, experts in the respective fields of research, I think that this is, indeed, a valuable contribution to the literature of mathematical physics.

Paul A. Blaga

Dwyer, W.G. and Henn, H.-W., *Homotopy Theoretic Methods in Group Cohomology*, Birkhäuser (Advanced Courses in Mathematics, CRM, Barcelona) 2001, Paperback, 98 pp., ISBN 3-7643-6605-2.

This books is based on the lecture notes of an advanced course on classifying spaces and cohomology of groups, that took place at the Centre de Recerca Matemàtica (CRM) in Bellatera (Spain), from May 27 to June 2, 1998. Although this course was part of a semester in algebraic topology, the contents of the book is, in our opinion, rather connected to what is now called *algebraic homotopy theory* rather to algebraic *topology* itself.

The book consists of two parts, corresponding to the lectures given by each of the two lecturers. The first part (by W.G. Dwyer) deals with the theory of classifying spaces for finite groups and their decompositions into classifying spaces corresponding to some of their subgroups. This a generalization of the corresponding decomposition method that was used lately for the classifying spaces of compact Lie groups and of their generalizations, the so-called *p-compact groups*, introduced by Dwyer and Wilkerson.

The second part of the book (by H.-W. Henn), is an introduction to another key ingredient in the study of the homotopy theory of classifying spaces of some classes of groups a, the theory of unstable modules over the Steenrod algebra. In particular, it is explained how this theory enables us to understand better the structure $mod-p$ cohomology ring of the classifying spaces of suitable classes of groups and, in some cases, even to perform the full computation of this cohomology rings.

As the description so far probably suggests already, this is a highly specialized book and is addressed to a rather narrow audience, having both an interest in the cohomology of groups and the necessary prerequisites (quite a lot of algebra, especially categorical one). For those who fulfilled these two requirements, however, it will be an enjoyable reading and very useful tool. As we, also, suggested, already, the authors are both experts in the field and the fact that the book is based on lecture notes, makes it appropriate, also, to be used for advanced graduate courses or, as well, for self-study.

Paul A. Blaga

Chruściel, and P.T., Friedrich, H. (Eds.), *The Einstein Equations and the Large Scale Behavior of Gravitational Fields: 50 Years of the Cauchy Problem in General Relativity*, Birkhäuser 2004, Hardback, 489 pp., ISBN 3-7643-7130-7.

The Einstein field equations are a system of 10 nonlinear partial differential equations. For a long period of time it wasn't very clear how should one formulate the Cauchy problem for these equations. The first existence theorem for such a problem has been proved by Yvonne Choquet-Bruhat in 1952. To celebrate the 50 years after this result, a Cargése Summer School was dedicated, in 2002, to the Cauchy problem for Einstein's field equations. This meeting is at the origin of this book. It is not, strictly speaking, a proceeding, as some of the lectures have been left out, since the respective topics were already treated in details elsewhere while, on the other hand, the book includes subjects that have not been lectured on during the school.

The Cauchy problem for Einstein's field equation has been an object of intense research in the last decades. However, in the monograph literature (not no mention the textbooks) it is almost absent, with the notable exception of the book of Hawking and Ellis (*The Large Scale Structure of Spacetime*, Cambridge University Press, 1973), which, however, is already more than 30 years old. As a monograph dedicated entirely to the field is still missing, a collection of pedagogical review articles, focused on the most important subjects, is the next best thing and it is fortunate that, finally, we have it.

The contributors are among the best known experts in the field and their names are, probably, familiar to anyone interested in general relativity. I am not going to mention them all, but I should say, nevertheless, that one of the most consistent contribution belongs to Yvonne Choquet-Bruhat herself (in fact, the book is dedicated to her).

With some notable exceptions (which either well treated in monograph literature or in other reviews, or represent a too new a material) the book cover most of the aspects of the Cauchy problem for gravitation, especially the newer ones (especially from the last 25 years), related, mainly, to *global* or *numerical* aspects. An aspect that seems to me important and which is only rarely treated is related to the Cauchy problems for spacetimes that are not globally hyperbolic and it is nice to see it discussed here.

I have the feeling that this is one of the most important books in the mathematics of general relativity that have been published lately. Personally, I wish I had available such a book 16 years ago when I wrote my diploma thesis (which was dedicated exactly to the Cauchy problem for Einstein's equations).

Paul A. Blaga

Bruno Cordani, *The Kepler Problem – Group Theoretical Aspects, Regularization and Quantization, with Application to the Study of Perturbations*, Progress in Mathematical Physics, Volume 29, Birkhäuser Verlag, Basel–Boston–Berlin 2003, XVII+439 pp, includes CD-ROM, ISBN 3-7643-6902-7.

This book contains a comprehensive treatment of the Kepler problem, i.e., the two body problem, covering the main aspects of this problem. The book illustrates the use of differential geometric methods in solving concrete physical problems, with the Kepler problem playing the role of a sort of "phylogenetic recapitulation" of the mechanics.

The author structured his book into four parts. In the first part, written at an undergraduate student level, the arguments are presented in an elementary fashion, and the properties of the problem are demonstrated in a purely computational manner. The chapters of this part are dedicated to basic facts in conics, basic properties of the Keplerian motion, the orbital elements in the elliptical case, separation of the variables and action-angle coordinates, the Schrödinger-, Pauli- and Fock quantizations of the Kepler problem, regularization and symmetry in the two body problem.

In the second part a unifying point of view, original to the author, is presented which centers the exposition on the intrinsic group-geometrical aspects. The topics presented in this part are: conformal regularization, spinorial regularization, separation of variables, geometric quantization and the Kepler problem with magnetic monopole. This part requires more mathematical background, which the reader will find in the fourth part.

The third part exploits some results of the second part to give a geometrical description of the perturbation theory of the Kepler problem. The general perturbation theory, perturbations of the Kepler problem and perturbations with axial symmetry are presented.

In the fourth part are exposed basic tools of differential geometry, Lie groups and Lie algebras, Lagrangian and Hamiltonian dynamics, necessary to understand the second part.

Each of the four parts, which are to some extent independent, could itself form the basis for a one-semester course.

The book includes a CD, which contains mainly the Microsoft Windows program KEPLER which calculates the effects of any perturbation of the Kepler problem and plots the resulting trajectories.

Ferenc Szenkovits

Kreck, M. and Lück, W., *The Novikov Conjecture: Geometry and Algebra* (Oberwolfach Seminars), Birkhäuser 2005, Paperback, 267 pp., ISBN 3-7643-7141-2.

Contemporary mathematics, largely, evolves around conjectures. Actually, many of the modern theories developed in the attempt to prove a conjecture. The most interesting and, not a single time, most difficult conjectures are connected to problems of classification. The Novikov conjecture falls exactly into this category. More precisely, it is related to the problem of classification of manifolds up to a homotopy equivalence. More specifically, it claims that the *higher signatures* of a manifold are homotopy invariants. The higher signatures are some numerical invariants associated to a manifold, built from the rational Pontrjagin classes and some cohomology classes of the fundamental group of the manifold. The conjecture is known to be true for special choices of the fundamental group but it is still not proven for arbitrary groups, although no counterexamples are known so far.

The book under review is based on the lectures given by the authors (two leading experts in the field) at an Oberwolfach seminar, held at the end of January 2004. The aim of the workshop (and, by extension, of the book) was to provide a guide to the Novikov conjectures and of its connections with other conjectures (those belonging to Baum-Connes, Borel and Farell-Jones).

The book starts with a very brief review of the conjecture and then provides basic information about the Whitehead torsion and the s-cobordism theorem. The following chapters are devoted to a survey of the surgery theory and to a definition of the assembly map. It is, the discussed the idea of the proof of the conjecture for finitely generated Abelian groups and the proof is used for applications to the classification of low dimensional manifolds. The rest of the book is devoted to a description of the Baum-Connes and Farell-Jones conjectures and their connections to the Novikov conjecture, as well to an exposition of the state of the art in the proof of these conjectures.

As the number of pages of the book suggests for itself, it cannot provide all the details and all the proofs. This is, as the author themselves mention, only "a guided tour", nothing more, nothing less. However, it is exactly this the reason why we consider the book to be extremely useful. After all, a book with all the proofs would require a huge space and it would be, virtually, unreadable, especially for the beginners. Instead, preserving the "atmosphere" of the lectures, the authors, not a single time, substitute the rigorous proofs either by carefully chosen worked examples, or by arguments that justifies the "credibility" of the result. Clearly, none should expect to master the Novikov conjecture after reading the book, especially if he is not, really, an expert in surgery theory, but he will probably have a very good idea on what the main problems and results are.

The prerequisites of the book are a solid knowledge of basic differentiable topology and a working knowledge of algebraic topology (including, for instance, characteristic classes). The book is highly recommended to graduate students interested in differential/algebraic topology and to researchers in these fields, wanting to have a rapid contact with the Novikov conjecture and the connected problems.

Paul A. Blaga

Carlos S. Kubrusly, *Hilbert Space Operators – A Problem Solving Approach,* Birkhäuser Verlag, Boston-Basel-Berlin 2003, XIII+149 pp., ISBN: 0-8176-3242-5 and 3-7643-3242-5.

Of course that a book with this title automatically reminds us the classic by P. Halmos, *A Hilbert Space Problem Book,* Van Nostrand 1967, 2nd Edition Springer 1982, Russian translation Moscow 1970. In the mean time, there have been published several books based on the same idea as, for instance, A. Kirillov , A. Gvishiani, *Théorèmes et problemes d'analyse fonctionnelle,* Editions Mir, Moscou 1982. The present book follows the same path as Halmos' book, excepting the facts that the solutions are given at the end of each chapter (and not in a second part of the book), and the selection of the included material reflects the progress made in the area since then as, e.g., a proof of the Lomonosov hyperinvariant subspace theorem. It is divided into twelves chapters headed as follows: 1. *Invariant subspaces*; 2. *Hilbert space operators*; 3. *Convergence and stability*; 4. *Reducing subspaces*; 5. *Shifts*; 6. *Decompositions*; 7. *Hyponormal operators*; 8. *Spectral properties*; 9. *Paranormal operators*; 10. *Proper contractions*; 11. *Quasireducible operators*; 12. *The Lomonosov theorem.*

Each chapter starts by surveying the background material, the problems being in fact propositions whose solutions are proofs. Although, some open questions are included, the book is not really a research monograph. For the more recent results exact references are given, for the others, although being the result of the efforts of many reputed mathematicians it is hard to give for each the exact source. The prerequisites are basic functional analysis (inner and normed spaces and operators acting on them) as, for instance, it is presented in author's recent book, C. Kubrusly, *Elements of Operator Theory,* Birkhäuser 2003, to which references are done in several places in the text.

The book is devoted to graduate students in mathematics, physics, engineering or economics for an interactive introduction into the subject. It can be used also by working mathematicians needing some results in the area, or by scientists wishing to apply operator theory in their field.

S. Cobzaş

Long, Y., *Index Theory for Symplectic Paths with Applications*, Birkhäuser (Progress in Mathematics, 207) 2002, 380 pp., Hardcover, ISBN 3-7643-6647-8.

The Morse index theory for geodesic on a Riemannian manifold is one of the well established parts of critical point theory. Unfortunately, such an index theory cannot be developed for Hamiltonian systems, because the corresponding functionals are strongly indefinite and the index is always infinite. Therefore, other ways of defining an index had to be searched for. There is no index theory that works for all Hamiltonian systems. We have, for instance, a good theory for convex Hamiltonians. The book under review is devoted to other kind of index theory, concerning the periodic solutions of of Hamiltonian systems, as well as, more generally, any path in the group of symplectic matrices.

We have to say, from the very beginning, that the author is one of the major international experts in the field and, to our knowledge, this is the first monograph entirely dedicated to to the subject (at least in English, as the book itself is largely based on an earlier Chinese edition).

The book is divided into five parts. The first two are intended to lay the foundation for the index theory; they are dealing with a detailed description of the symplectic group and the formulation of the variational problem.

The next two parts constitute, together, the core of the book. Thus, the third part actually describes the index theory for symplectic paths and its connection with other Morse indices, while in the fourth part it is developed an iteration theory for the symplectic index, an analog of the Bott's iteration theory for the Morse index of geodesics in Riemannian manifolds.

Finally, the last part of the book is devoted, of course, to “applications”. In particular, there is investigated the connection of the index theory with an older conjecture of Rabinowitz, related to the existence of some periodic solutions of a particular variational problem; the index theory is also applied to the investigations of periodic Lagrangian orbits on tori and the closed characteristics on convex hypersurfaces.

This book is, clearly, a major contribution to the literature on critical point theory and it should prove useful for anyone interested in the field, starting graduate students up. The numerous worked examples makes the book quite readable, in spite of its rather specialized nature. We have to mention, also, that those interested in symplectic geometry (and not necessarily in index theory), will find very enjoyable the first part of the book, including detailed discussions of facts from symplectic algebra that are not easy to be found elsewhere.

Paul A. Blaga

Peyre, E. and Tschinkel, Y. *Rational Points on Algebraic Varieties*, Birkhäuser (Progress in Mathematics, 199), 2001, 446 pp., Hardcover, ISBN 3-7643-6612-5.

This is a collection of carefully selected research papers by leading experts on arithmetic geometry, meant to offer an idea of the state of the art in the study of rational and integral points on higher-dimensional algebraic varieties. As the editors emphasize, there is “an emphasis on how rational points are distributed with respect to the classical, Zariski and adelic topologies”.

The contributors are, beside the editors: Carmen Laura Basile, Thomas Anthony Fisher, Niklas Broberg, Antoine Chambert-Loir, Jean-Louis Colliot-Thélène, Alexei Skorobogatov, Brendan Hasset, Dimitri Kanevski, Yuri Manin, Bjorn Poonen, Philippe Satgé, Matthias Strauch, Peter Swinnerton-Dyer and Trevoe Wooley.

To be a little bit more specific, let me say that the paper are related (among others) to: cubic surfaces, complete intersections, the asymptotic of rational points on compactifications of torsors under linear algebraic groups.

I have to say that some of the papers are in French, the rest of them are written in English.

The book will be useful to graduate students and researchers in algebraic and arithmetical geometry, as well as to those interested in analytical number theory.

Paul A. Blaga

Poincaré, H., *Scientific Opportunism – L’Opportunisme scientifique*, Birkhäuser (Publications of the Henri-Poincaré Archives), Compiled by Louis Rougier, Edited by Laurent Rollet, 2002, 208 pp., Hardcover, ISBN 0-7643-6539-0.

As it is well known to anyone, Poincaré was not only a great scientist, he was also a great one of the greater philosophers of science. In this quality, he published, during his lifetime, three books that were very successful (and they still are, if I may add): *La science et l’hypothèse* (1902), *La valeure de la science* (1905) and *Science et méthode* (1908). Another philosophical book was published shortly after his death (*Dernière pensées* (1913)).

In 1919, the French philosopher Gustave Le Bon asked the widow of Poincaré the permission to published another philosophical book, gathering together different articles written by Poincaré. Louis Rougier was charged with the preparation of the volume. Unfortunately, finally the family of Poincaré did not accept the publications, mainly because it was considered that the material was to heterogeneous and that wasn't much philosophical content in it. All in all, they considered that this book couldn't, righteously, considered to be Poincaré's fifth philosophical book.

Eighty years after, Laurent Rollet, a respect French expert in the history and philosophy of science, decided to restore the project and to shed some light, also, on the history of the preparation of the original project and on the reasons that led, finally, to its rejection.

As I said before, the volume (written in French!) contains, mainly, reprints of some of the Poincaré's works that have not been included into his previous philosophical books and in which he expresses his opinions (more or less philosophical!) about different domains of science. The book is divided in three parts: *Geometrical Conventions* (including notes on the foundations of geometry and on the noneuclidean geometry), *The Approximations of Celestial Mechanics* (with notes related, among others, to the cosmogonical hypotheses, the stability of the solar system, the three body problem, the comets) and *Actual Scientific Problems* (with various notes, for instance about the telegraph or about the light and electricity according to Maxwell and Hertz).

While, probably the heirs of Poincaré were right (this is hardly a book of philosophy, it is probably closer to popular science, in many respects), nowadays the book represent an important contribution to the understanding of Poincaré's way of thinking and it will be very interesting for anyone involved, in a way or another, in the history of science.

Rollet deserves congratulations for the way he edited this book, for the impressive number of comments and for the very interesting investigations related to the early history of this project, as well as to the relations between Henri Poincaré and Gustave Le Bon.

Paul A. Blaga

Janos Galambos and Italo Simonelli, *Products of Random Variables. Applications to Problems of Physics and to Arithmetical Functions*, Marcel Dekker, New York - Basel, 2004, 323 pp. ISBN 0-8247-5402-6.

This book gives a unified theory of complete convergence of products of independent random variables and their applications, as for example: interactive particle systems, asymptotic distributions of order statistics, asymptotic properties of arithmetical functions, symmetry of limiting distribution of products of random variables etc. The theory developed in this book also leads to a new group of characterizations of probability distributions.

The book could be of interest to mathematicians, statisticians and physicists. It is a very helpful research reference and can be used in special courses at any level of graduate study. It is assumed that the reader is familiar with the fundamentals of probability theory. The seven chapters of this book are: Foundations (basic notations and concepts of probability theory), Limit Theorems, Characterization (of probability distributions), Interacting Particles, Arithmetical Functions, Miscellaneous Results. The book also contains a comprehensive list of references.

Hannelore Lisei

Valette, A., *Introduction to the Baum-Connes Conjecture*, Birkhäuser (Lectures in Mathematics, ETH Zürich), 2002, 104 pp., Softcover, ISBN 3-7643-6706-7.

The Baum-Connes conjecture is, probably, one of the most active area of research belonging to what is now called "noncommutative geometry" and, as the author itself mentions in the introduction, it identifies two objects associated with a countable group, one analytical and the other one geometrical/topological. Moreover, several other important conjectures appear to be related in a way ore another to the Baum-Connes conjecture.

This book, written by one of the leading experts in the field, evolved from a set of lecture notes for a graduate course given by the author in 1998 at ETH, is the first book entirely dedicated to the subject and it is a (successful) attempt to provide a readable introduction to at least a part of the main topics.

After a short survey of the Baum-Connes conjecture, the author describes in more details the different ingredients that enter its formulation (K-theory for C^*-algebra, classifying spaces and K-homology, equivariant KK-theory, the analytical assembly map). After examining some examples of assembly maps and discussing the Dirac and dual Dirac methods, the book ends with a sketch of the proof given by Vincent Lafforgue to the conjecture for some particular cases of countable groups (namely co-compact lattices in $Sp(n, 1)$, $SL(3, \mathbb{R})$ and $SL(3, \mathbb{C})$).

"Attacking" the Baum-Connes conjecture is not an easy task. It assumes knowledge from many fields of mathematics (group theory, functional analysis, algebraic topology, K-theory, to mention only few), but for those initiated (probably mostly graduate students and researchers interested in noncommutative geometry), this book is, definitely, worth reading and it will become, surely, a classic in the field.

Paul A. Blaga

Alberto Facchini, Evan Houston and Luigi Salce (Eds.), *Rings, Modules, Algebras, and Abelian Groups*, Marcel Dekker, Inc., New York - Basel, 2004, XX+498 pp., Softcover, ISBN 0-8247-4807-7.

The present volume is the Proceedings of the Algebra Conference that took place at the Venice International University, Italy, from June 3 to 8, 2002. Undoubtedly, the conference represented a peak in the Algebra events organized in recent years, considering not only the number of participants (about 200) from all over the world, but, more importantly, the high-quality and influential work presented there. Out of the more than 110 main lectures, plenary lectures or communications, the volume gathers 38 both survey and research articles. They cover the six sections of the conference, namely *Abelian Groups*, *Algebras and their Representations*, *Commutative Rings*, *Module Theory*, *Ring Theory* and *Topological Algebraic Structures*, with emphasis on the first five, as they were represented in the talks.

The papers on abelian groups refer to finitely generated and cogenerated QD groups, almost completely decomposable groups, base change decomposition problem and uniquely transitive torsion-free abelian groups. Algebras and their representations are present through: global deformations of Lie algebras, group identities on unit groups of group algebras, projective covers and injective hulls in abelian length categories, path coalgebras of quivers with relations and central Galois algebras of a Galois algebra. The section on commutative rings was dedicated to the celebration of the 30-th anniversary of the publication of Robert Gilmer's monograph "Multiplicative Ideal theory". Its topics are, among others: the Picard group of the ring of integer-valued polynomials, divisorial multiplication rings, maximal prime divisors in arithmetical rings, the survey "Forty years of commutative ring theory", non-finitely generated prime ideals in subrings of power series rings, the Mori property in rings with zero divisors, minimal prime ideals and generalizations of factorial domains, factorizations of monic polynomials and affine pairs. Module theory benefits of an important part as well, with articles on: direct limits of modules of finite projective dimension, cotilting modules and generalized Morita duality, dualities induced by cotilting bimodules, symmetries and asymmetries for cotilting bimodules, strongly flat modules over Matlis domains, Butler modules, reduced modules and super-decomposable pure-injective modules. Among the topics on ring theory included in the volume we mention: generalized E-rings, rings with finitely many orbits under the regular action and distance between finite rings.

The contributions to this book belong to a number of top specialists, out of which it would be rather unfair to mention just few names. They touch a wide range of topics of the nowadays research in the above mentioned areas and, in the same time, take a look back at the past decades of commutative ring theory as well as open challenging perspectives of future research. All these make the volume an extremely valuable tool and source of inspiration for an algebraist working or willing to work at a high level.

Septimiu Crivei