J. Indian Inst. Sci., July–Aug. 1995, 75, 485–492.

BOOK REVIEWS

Matrix and operator valued functions by I. Gohberg and L. A. Sakhnovich, Birkhauser Verlag AG, Klosterberg 23, CH-4010 Basel, Switzerland, 1994, pp. 240, SFr 98.

This is a memorial volume dedicated to the mathematician V. P. Potapov who spent a major part of his professional life in Odessa, Ukraine, where the famous Odessa school of mathematics had sprung up around M. G. Krein. While Krein's enormous and multifaceted contributions to functional analysis and operator theory are very well known, that of Potapov are not probably as much familiar. The main contribution of Potapov has been in the solution of the Nevanlinna–Pick interpolation problem and its application in network theory.

The Nevanlinna–Pick interpolation problem is the following. We are given a set of points $\{z_j\}_{j=1}^n$ in the open upper half plane (Im $z_j > 0$) (called interpolation nodes) and a set of $m \times m$ matrices $\{w_j\}_{j=1}^n$ (called interpolation values) such that Im $w_j > 0$. One has to find a Nevanlinna function $w(z)$ (an $m \times m$ matrix-valued function analytic in the open upper half plane with the property that Im $w(z) \geq 0$ for Im $z > 0$) such that $w(z_j) = w_j$. If the information block matrix $S \equiv \left(\dfrac{w_j - w_k^*}{z_j - \bar{z}_k}\right)_{j,k=1}^n$ is strictly positive, then one has a non-degenerate Nevanlinna–Pick problem which has infinitely many solutions and the general solution of the problem can be given in terms of them. These solutions can be expressed with the help of a block-matrix function $\mathcal{U}(z)$ which is analytic in the upper half plane and has interesting properties: (i) it is J-expensive, *i.e.*, $\mathcal{U}(z)^* J\mathcal{U}(z) \geq J$ for Im $z > 0$ and (ii) its boundary value to the real axis $\mathcal{U}(\lambda + i0)$ exists and is J-unitary, *i.e.*, $\mathcal{U}(\lambda + i0)^* J\mathcal{U}(\lambda + i0) = J$, $\lambda \in \mathbb{R}$. Here J is an appropriate involution ($J = J^* = J^{-1}$) giving rise to an indefinite metric in the associated vector space. The two contributions in the volume, one by Ivanchenko and Sakhnovich and the other by Kheifits and Yuditski describe these features very nicely.

The paper of Azizov and Iohvidov on 'the geometric theory of operators in spaces with indefinite metric' gives a brief description of J-nonexpansive operators and their J-polar decomposition while that of Ginzburg and Shevchuk deals with Potapov's theory of Blaschke–Riesz-like multiplicative representation of $\mathcal{U}(z)$. In the later paper, one encounters the unexpected connection of these theories with that of Stieltje's double integral operators, developed by Birman and Solomyak (*Topics in Math. Phys.*, 1967, 1, 25–64, Consultants Bureau, New York). This connection has not been brought out very clearly and there may be scope for some interesting work here.

Besides the above, there are the contributions of Arov on applications of Potapov's theory to networks, of Krein and Ovcharenko and Sakhnovich on the inverse problem for Sturm–Liouville equation system. On the whole, the volume should be very useful for researchers in function and operator theories though a bit more details and proofs would have made it easier reading.

The first article on V. P. Potapov makes a very interesting reading giving the reader a glimpse of the academic life around Odessa during the lifetime of Potapov. It is quite sad but revealing that Potapov in his later years thought that his security in his position depended on his using function theoretic methods rather than the Hilbert space ones (footnote p. 170).

Indian Statistical Institute
7, SJS Sansanwala Marg
New Delhi 110 016.

K. B. SINHA

Nonselfadjoint operators and related topics by A. Fientuch and I. Gohberg, Birkhauser Verlag AG, Klosterberg 23, CH-4010 Basel, Switzerland, 1994, pp.432, SFr 148.

In 1965, I. C. Gohberg (one of the editors of the volume under review) and M. G. Krein published a book in Russian titled *Introduction to the theory of linear nonselfadjoint operators*. This was soon translated into English and appeared as Volume 18 in the series *Translations of Mathematical Monographs* published by the American Mathematical Society. Both the authors were known to be powerful and creative mathematicians and had been prolific and indefatigable writers. This book helped less energetic mathematicians understand some of their work and that of the remarkable school around Krein. Thirty years after its publication, the book still remains one of the best sources to turn to if one is interested in the basic properties of s-numbers (now called singular values), norm ideals and infinite determinants.

The volume under review can perhaps be described as bewildering for the general operator theorist, in the same sense as the numerous papers might have been before the publication of Gohberg and Krein in 1965. This is a collection of papers that would normally appear in a journal and be of interest to a diverse collection of experts. The papers seem to be of high quality. However, they are not all thematically related.

The first paper by M. S. Livsic (to whom the volume is dedicated) and A. S. Markus explores some properties of the joint spectrum of a commuting tuple of operators each of which is of the form $H + iK$, where H and K are selfadjoint and K is compact. This is related to the study of discriminant varieties in algebraic geometry.

There are two papers, one by A. Ben-Artzi and I. Gohberg and the other by M. Rosenblum on orthogonal polynomials. The latter studies these in connection with Bose-like oscillators.

Several papers relate to interpolation, systems theory, extension problems and related matters. These are all by well-known experts like H. Dym and P. Fuhrmann, to name two.

Three of the papers deal with different classes of norms. These are of interest in perturbation problems. A solitary and short paper gives a readable introduction to cyclic cohomology of Banach algebras. This is related to the rapidly expanding subject called 'noncommutative differential geometry' started by A. Connes about 20 years back. There is one paper on computers in operator models. This gives rules for reduction to a normal form for some expressions that arise in the Nagy–Foias operator models.

This description should help the reader decide whether this volume has a paper (or papers) of interest to her. Seeing the wide variety and the rather special nature of the topics covered, only a paper-by-paper review could possibly do full justice to the contents.

Indian Statistical Institute
New Delhi 110 016.

RAJENDRA BHATIA

Families of automorphic forms by R. W. Bruggeman, Birkhauser Verlag AG, Klosterberg 23, CH-4010 Basel, Switzerland, 1994, pp. 308, SFr. 138.

This is a very nicely written book on real analytic automorphic forms containing a wealth of information dealing with several extensions of classical results to cofinite discrete groups, with most of the results appearing for the first time in book form. The author has to be commended for this lucid presentation of the difficult material on families of automorphic forms over the upper half of the complex plane, including those forms with singularities and which do not necessarily have a restricted polynomial growth at the cusps. A systematic account of the theory of automorphic forms based on the fundamental contributions of several mathematicians, Hecke, Maass, Roelcke and Selberg, along with extensions is available in this book and it is a must for anyone to know about automorphic forms.

It could be recalled that the modern theory of automorphic forms is an outcome of class field theory, theory of quadratic forms, study of representations of reductive groups and the deep results of spectral theory based on Eisenstein series and trace formula. In a naive sense, functions over the upper half of the complex plane having a special transformation behaviour under a discontinuous group of non-Euclidean motions are termed automorphic forms. The main feature of the book under review is that it contains extensions of classical results in an abstract setting of cofinite discrete groups.

In very simple terms, a function f on the upper half of the complex plane $y > 0$ is called an automorphic form whenever it satisfies: $f((az+b)/(cz+d)) = (cz+d)^k f(z)$ and $f(iy) = 0(y^n)$, for some k and n, as $y \to \infty$, where $z = x + iy$, and the 2×2 matrix $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ over integers is nonsingular with determinant +1. If k is a positive integer and if f is analytic, f is known as a modular form of weight k. In case $k = 0$ and if f satisfies the non-Euclidean Laplacian, $-y^2\ (f_{,xx} + f_{,yy}) = vf$, then f is called a Maass form with eigenvalue v. If further, f satisfies the stipulation: $\int_0^1 f(x+iy)\ dx = 0$, f becomes a cusp form. These forms possess Fourier expansions and have a number of characteristic features, amenable for extensions to cofinite discrete groups.

The author of the book under review has succeeded in giving a masterly account of the theory of automorphic forms in a generalized setting. The book is divided into two parts comprising 15 chapters. Twelve chapters constitute the first part in which a systematic development on families of automorphic forms, eigenfunctions and singularities is made, with as many as five chapters containing new material hitherto not available in book form. The second and concluding part consists of three chapters comprising examples on modular groups, theta groups and commutator subgroups. The study is highly rewarding if each result of the first part is suitably interpreted choosing an example from the second part. Of course, examples are the most enjoyable.

The author has to be thanked by the mathematical community for writing such an excellent account on families of automorphic forms in an attractive style. The reviewer recommends acquisition of a copy of the book by every library, as it is invaluable to every aspirant who attempts a study on automorphic forms.

Department of Mathematics
Bangalore University
Bangalore 560 001.

K. S. HARINATH

Quantum theory of angular momentum: selected topics by K. Srinivasa Rao and V. Rajeswari, Narosa Publishing House, 6, Community Centre, Panchsheel Park, New Delhi 110 017, 1993, pp. 315, Rs 385.

The quantum theory of angular momentum, developed principally by Wigner and Racah, is an indispensable subject for any physicist working in any branch of modern physics (be it solid state, molecular, atomic, nuclear or particle physics)—working knowledge of the so-called $3j$, $6j$ and $9j$ angular momentum coefficients is essential for him/her. As Peter Carruthers wrote in his foreword to the two monumental volumes (published in 1981) on quantum theory of angular momentum by Biedenharn and Louck: "The study of the symmetries of physical systems remains one of the principal contemporaty theoretical activities. These symmetries, which basically express the geometric structure of the physical system in question, must be clearly analyzed in order to understand the dynamical behavior of the system. The analysis of rotational symmetry, and the behavior of the physical quantities under rotations, is the most common of such problems." Besides, for reasons of rotational symmetry which is of prime importance in spectroscopy, angular momentum appears naturally when one deals with rotors, tops, turns, etc. Although angular momentum algebra is described in almost all books without much reference to group theory (this branch of mathematics is responsible for most of the advancements in modern physics in the last fifty years), in fact, quantum theory of angular momentum corresponds to a study of orthogonal group in three dimensions (O(3) group) or the special unitary group in two dimensions (SU(2) group). In addition to being of practical value for physicists, angular momentum theory is valuable to mathematical physicists and mathematicians and it is the latter aspect that forms the basis for the present book by Srinivasa Rao and Rajeswari. The volumes by Biedenharn and Louck documented everything that one wants to know about quantum theory of angular momentum and a large number of special topics in the subject are collected in 12 sections in these volumes. Some of these special topics are investigated in depth in the last 15 years, primarily for their mathematical content, by the present authors and some others and the results of this research are brought to one place in the present monograph. This book is a welcome addition to the literature on quantum theory of angular momentum.

Three special topics are covered in the book and in addition there are two other topics. After giving some mathematical preliminaries in Chapter 1, essentially complete account of the representation of $3j$, $6j$ and $9j$ angular momentum coefficients in terms of hypergeometric functions of unit arguments, the symmetries of these coefficients including Regge symmetries and in the case of $3j$ coefficients, the Wigner, Racah and Majumdar forms are given in Chapters 2–4, respectively. The polynomial zeros of $3n$–j coefficients, a topic that raises tremendous curiosity, are dealt with in detail in Chapter 5. These zeros are classified by their degree and those of degree 1 are related to homogeneous multiplicative Diophantine equations while those of degree 2 are related to the solution of Pell equation. The topic of Chapter 6 is orthogonal polynomials in discrete variables and the $3n$–j coefficients. The $3j$ coefficients are related to Hahn polynomials and the $6j$ coefficients are related to the Racah or Askey-Wilson polynomials. The recurrence relations for the polynomials give the recurrence relations for the angular momentum coefficients. The presentation in Chapters 2–6 is clear and complete. The mathematics (sometimes number theory) involved is extensive but the thoroughness with which it is presented makes it easy to read and understand. The last chapter of the book is devoted to numerical computation of $3n$–j coefficients using their representation in terms of hypergeometric functions. This chapter should have been much shorter or relegated to a short appendix.

Quantum groups and the associated algebras, introduced for physicists, from the stand point of harmonic oscillators, in 1989 by Biedenharn, but otherwise well known to mathematicians since 1980, has become a topic of frontline research in physics and mathematical physics in the last five years. There are significant developments in deriving, for the quantum (q) SU (2) algebra, the so called q-analogs of $3n$–j coefficients. A description of some of these developments together with the representation of q-$3n$–j coefficients in terms of q-hypergeometric functions is embedded in Chapters 2–4. This new emerging area has thus lost focus in the book. One wonders why the authors chose not to have separate chapter on q-$3n$–j coefficients.

This book is extremely valuable for mathematical physicists. However, it suffers from the problem that the physical significance and applications of the results in Chapters 2–6 are yet to be explored in detail and this makes the reading of the book difficult for physicists. The remarks at the end of various sections cure this deficiency to some extent—they also give historical background which adds interest and authority to the book besides giving a perspective to the mathematical problems addressed. The book also contains an essentially complete bibliography of the special topics that are covered and this is extremely valuable.

Books on special topics are very valuable as they bring to focus the results of important in-depth research work carried out by individuals or groups of individuals which are otherwise scattered in various research journals—the present book does this job for some of the topics in angular momentum theory. Hopefully, it will provide stimulus for someone to write similar books on the algebra of SU(1, 1) and SU(3) groups. The book is excellently produced with minimal number of misprints. The authors change notations at places to suit the word processor they used and this is unfortunate.

This book is a must for all libraries and I recommend it for all theoretical and mathematical physicists (the price is affordable).

Physical Research Laboratory
Ahmedabad 380 009
email: kota@prl.ernet.in

V. KRISHNA BRAHMAM KOTA

Muonic atoms and molecules by L. A. Sahaller and C. Petitjean, Birkhauser Verlag AG, P. O. Box 133, CH-4010 Basel, Switzerland, 1993, pp. 370, SFr. 98.

Muons have a pride of place in the scheme of elementary particles. However, present scientific interest in muons stems mainly from the fact that they have an appreciably long half-life, a mass intermediate between that of the electron and of the proton and are readily captured in atomic and molecular orbitals giving them rather unique properties. The possibility of sustained fusion reactions catalysed by muons has provided a strong driving force to research in this field. However, experiments in muonic atoms and molecules had to be limited to a few high-energy accelerator laboratories. This has given rise to an exclusive group of researchers. The volume under review is a record of the proceedings of a meeting held in Switzerland during April 5–9, 1992. The presentations have been arranged in six broad groups—Nuclear muon capture, fusion and fission, Muonic atoms spectroscopy, Muon catalysed fusion and cascade, Muon transfer, and Hot muonic atoms. The nuclear muon capture is a rich source of information in the area of electro-weak and hadronic physics. The two presentations on muon capture in helium-3 and radiative muon capture on hydrogen deal with this area of fundamental physics. The emphasis is on refined measurements with new facilities. Muon-catalysed fusion involves several steps in the life history of muon following capture in a molecular orbital till its 'death', requiring basic understanding in several areas such as atomic physics, molecular physics and physics of strong and weak interactions. The book contains articles on all aspects on muon-catalysed fusion and muonic atom spectroscopy, muonic cascades and muonic transfer. The volume also includes the status reports on two experimental facilities having muon channel and the new developments in the experimental methods. The volume is a useful addition to a library. However, it is not likely to find a place in the bookshelves of individual scientists except those directly involved in muon physics research.

Institute of Physics
Bhubaneswar 751 005.

V. S. RAMAMURTHY

Quantum mechanics by V. K. Thankappan, Wiley Eastern Ltd, 4835/24, Ansari Road, Daryanganj, New Delhi 110 002, 1993, pp. 539, Rs 110.

This is an outstanding text written in comprehensible language, amply illustrated with cross-references and organized in logical manner. The material covered is exhaustive for a two-semester course on quantum mechanics. It is written in pedagogical style, topics are very well chosen and arranged in clearly defined chapters which build up the subject matter. The book is based on actual lectures delivered by the author and contains many classroom-style explanatory footnotes, which often are missing from textbooks. These also make the book an excellent text for self-study.

It contains everything that an introductory text should have—angular momenta, hydrogen atom, approximation methods, scattering and prelims collected in a chapter appropriately titled Quantum dynamics, a lucid chapter of introduction followed by a well-written chapter on linear vector spaces; and many things that an advanced text in quantum mechanics should contain such as density matrices, relativistic wave equation and field quantization. In addition, there are five appendices, two of which contain descriptions of antilinear operators and special functions.

With all this the best part of the book is its price. For Rs 110 one gets so much quantum mechanics. It makes the book affordable to every student of physics, chemistry and engineering who can thus possess a personal copy unlike many foreign books which one can only refer to in the libraries. I strongly recommend the book to every student of quantum mechanics.

Department of Physics
Indian Institute of Science
Bangalore 560 012.

ANIL KUMAR

Radiation theory and the quantum revolution by Joseph Agassi, Birkhauser Verlag AG, P. O. Box 133, CH-4010 Basel, Switzerland, 1993, pp. 196, SFr. 68.

The quantum theory of radiation and matter is one of the most revolutionary developments that physics has witnessed in its growth over the centuries. It was inaugurated in 1900 with Planck's discovery of his law for the frequency distribution of the energy density of black body radiation, that is, of radiation in equilibrium with matter at a definite temperature. Thus the idea of the quantum arose first from properties of radiation. Its application to matter came somewhat later with Bohr in 1913, following some critical inputs due to Einstein on the way. While Planck's work is naturally seen as heralding the birth of quantum theory, it was itself clearly the culmination of a long line of development. It is true that most students of physics do not come across this side of the picture, but many historians of physics have filled this gap. The present book is one such attempt to give, we might say, a microscopically detailed account of the events that took place over a century or so before, and leading up to, Planck's monumental work.

The subject is a very rich one, and a diligent historian can supply as much detail as he wishes. Obviously the key lies in the organization of one's chosen material. The author explains that he intends to spare no one in his account. As for the physics, he covers a wide range of ideas, theories and experiments. Questions about the natures of light and of heat, of seeing and sensation, arise easily and have been with us for long. The author traces the many attempts to find answers, developed over centuries, while interspersing them with sharp comments on individual scientists, the philosophy of science, different attitudes towards problem solving in science, and so on. He writes about Newton's influential views on the constitution of light, why he believed it to be corpuscular, his views on colours, fire and flame; and of the period when heat and light were regarded as different in their essential natures. The gradual transition to the wave picture of light in the hands of Young and Fresnel, and the rise of spectroscopy thanks mainly to Wollaston and Fraunhofer, merit major chapters in this book. At the same time the fundamental processes of interaction between matter and radiation became questions of crucial importance. In this context the author discusses the processes of reflection, refraction, absorption and dispersion experienced by light when it impinges upon matter. He also dwells at some length on the polarization of light and the phenomena of fluorescence and phosphorescence.

Naturally one of the longer chapters of the book is devoted to Kirchoff's work and his law. It was a tortuous path indeed to the realisation that absorption and emission processes, dark and bright spectral lines, are in precise correspondence with one another, or are 'mirror images' of each other. Kirchoff's proof based on thermodynamic principles that there is a *universality* to the properties of radiation at a definite temperature was clearly *the* most important first step on the way to Planck's law and therewith to the quantum theory. But there were other crucial steps too, involving Boltzmann, Wien, Rayleigh and Jeans on the way. All these are covered in critical fashion. The story ends with Planck's own work described against the background of his training, temperament, and conservative attitude which contrasted so greatly with the younger revolutionary Einstein. Three appendices extend as well as cover in slightly more detail some aspects of the main text.

Having said that and outlined the contents of this book, the reviewer cannot refrain from expressing some views about the general manner in which the author has presented his material. It goes without saying that in the normal study of physics one often remains ignorant of much rich detail and of the personalities of the physicists involved—also only the successes are remembered. It is but natural that the balance gets restored by reading histories of the subject. Each history is of course a particular reconstruction of the past. What is however somewhat jarring and distracting about the present account is the constant diatribe against "stuffed-shirt professors of science", and the desire to show up other writers almost with a vengeance, and to discount them. Beyond a point, such a style, expressing pungent opinions so often, gets tiresome. One cannot help feeling that it may have been better if the author had expressed his general attitudes, prejudices and judgements—on the subject and on individuals—concisely once and for all, and then gone on to a straight historical and technical account. There is also a tendency to be repetitive and wordy—this unfortunately comes in the way of clarity of exposition. The story is fascinating and of deep significance. A more carefully organized and tightly written account, including so much interesting detail that most of us are generally unaware of, might have been more effective. As a matter of history, one is disappointed to see Satyendra Nath Bose systematically mistaken for Jagadish Chandra Bose!

The book appears at first sight to be produced rather well but one quickly finds that an editorial job would have been very worthwhile. This may be the price one pays for directly reproducing a text prepared by an author himself in camera-ready form. Thus one finds a rather large number of slips in grammar, spelling, and linguistic style—"concentric straight lines", "Kirchoff's function should hopefully yield the relation between temperatures and wavelengths of light", ...—which an editor could have easily removed. Still, one does learn several things from this book, about little known details of the history of physics, personalities, clashes, attitudes and philosophical predispositions, so that one can then return to one's own work with a more complete and balanced understanding of the entire enterprise.

N. MUKUNDA

Centre for Theoretical Studies
Indian Institute of Science
Bangalore 560 012.

Lectures on the geometry of Poisson manifolds by I. Vaisman, Birkhauser Verlag AG, Klosterberg 23, CH-4010, Basel, Switzerland, 1994, pp. 216, SFr. 78.

The role of symplectic manifolds in physics, and more particularly in mechanics is well known. Conservative nolonomic mechanical systems are modelled on symplectic manifolds. The equations of motion are written in the Hamiltonian fashion using the Poisson bracket constructed from the symplectic structure on the momentum phase space of the mechanical system. As everyone knows this formulation is important in quantizing the mechanical system. This is the entry to the algebraic world of Poisson brackets on the algebra of smooth functions on the momentum phase space of a mechanical system. A Poisson bracket is defined by the following fundamental properties. If we denote by $\{,\}$, the Poisson bracket of functions then 1) $\{,\}$ is a real bilinear map, 2) $\{,\}$ is skewsymmetric, 3) $\{fg, h\} = f\{g, h\} + \{f, h\}g$ for any functions f, g, h, 4) $\{,\}$ satisfies the Jacobi identity. Deriving Poisson brackets from a symplectic structure is called the covariant approach. Res Jost found the contravariant approach to Poisson brackets. He observed that the first three properties of a Poisson bracket define a skewsymmetric contravariant 2-tensor field, which is nowadays called a bivector field, on the momentum phase space. Later, Lichnerowicz found that the fourth condition is equivalent to saying that the Schouten–Nijenhuis bracket[1] of the bivector field with itself is zero. These two observations laid the foundation for the differential geometric definition of a Poisson manifold. A local study of Poisson manifolds was taken up much before Lichnerowicz in the name of "Generalized Poisson Brackets" by Sudarshan and Mukunda to understand Dirac's bracket. Around 1983 it was found that Lie himself had started studying Poisson structures though he ended up with the theory of Lie algebras and Lie groups.

One virtue of Lichnerowicz's approach is that it is a global one and the other is that it suggests the definition of the Poisson cohomology immediately. It is interesting to note that certain cohomology classes give us all possible quantization processes.

In the later years it was shown that the theory of Poisson manifolds can be used as a mathematical setting for time-dependent Hamiltonian systems, Dirac brackets, etc. With the recent introduction of Hamiltonian Lie groups (or Poisson Lie groups) and qunatum groups by Drinfeld the complexion of this area has completely changed. The algebraic aspects of the theory have come to the forefront.

Though for a physicist a Poisson bracket is a mere tool or an intermediate step in the process of quantization, a mathematician finds it to be an interesting and rich source of geometric consequences. Izu Vaisman has given a very good introduction to this aspect in the book under review.

So far, to learn Poisson geometry one had to study the research notes[1] and some parts of the books[2,3] on Poisson geometry. Izu Vaisman has given the mathematical world a good presentation of the theory to date. One can notice the energies he has put into making a text book in this field bringing together material straight from research articles.

The author begins the book by recalling the definitions and some facts about the Schouten–Nejenhuis bracket and Poisson bivector fields, and has given a survey of the generalized distribution and the generalized Frobenius theorem keeping in mind the distribution defined by the Hamiltonian vector fields on a Poisson manifold. The third chapter gives a good review of some important examples of Poisson manifolds. The next three chapters give us a detailed and up-to-date version of Poisson calculus, Poisson cohomology, Poisson homology and quantization. The author has meticulously presented all the major contributions to Poisson cohomology and quantization adding some new results and has also illustrated some difficulties in computing the cohomology classes.

Chapters 7, 8 and 9 constitute a careful compilation of Poisson reduction and realizations of Poisson manifolds by symplectic groupoids. The effort put in by the author is to be appreciated.

The last chapter is a lucid exposition of results on Poisson–Lie groups. The correspondence between the space of multiplicative bivector fields and the space of 1-cocycles of the Chevalley–Eilenberg cohomology with respect to the adjoint representation, and the correspondence between the Poisson multiplicative bivector fields and the Lie bialgebras has been presented clearly. Further this chapter gives us some methods of constructing Poisson–Lie groups.

This book is highly recommended to those who wish to learn Poisson geometry and to those who are interested in learning quantum groups through Poisson geometry.

References

1. Bhaskara, K. H. and Viswanath, K. — *Poisson algebras and Poisson manifolds*, Pitman Research Notes in Mathematics, Vol. 174, 1988, Longman Science.
2. Bruhat, Y.-C. and Dewitt-Morette, C. — *Analysis, manifolds and physics*, Part II, 1989, North-Holland.
3. Libermann, P. L. and Marle, C.-M. — *Symplectic geometry and analytical mechanics*, 1987, D. Reidel.

K. H. Bhaskara

Visiting Fellow
Department of Mathematics and Statistics
University of Hyderabad
Hyderabad 500 0134.