

Book Reviews

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BOOK REVIEWS

Pták, P., Pulmannová, S.: QUANTUM LOGICS (Slovak). Veda, Bratislava 1989, 222 pages.

The submitted book presents a systematical monograph in the field of the theory of quantum logics that represents a mathematical model of the present quantum theories.

The introduction of the book is devoted to the development of ideas of physical phenomena, represented by quantum-mechanical models. The work itself is divided into seven chapters that can be characterized as follows:

Chapter 1: Quantum Logics, Fundamental Properties and Constructions. The character of the chapter is introductory. Fundamental notions of the theories of quantum logics are defined here.

Chapter 2: States on the Logic. The notion of the state on the logic is analysed in detail. After proving the generalized variant of the Loomis–Sikorski theorem a considerable part of the chapter is devoted to the Jauch–Piron property.

Chapter 3: Superposition Principle. After introducing the superposition of the states the superposition principle is studied in detail. The authors present the generalized superposition principle which does not depend upon the linear structure of the state space. The final part of the third chapter is devoted to analysing a special case of the generalized Piron theorem and to representing the logics in the lattice of subspaces of the vector space.

Chapter 4: Observables. The chapter introduces one of the basic notions — observable — as a morphism of the sets of Borel subsets of the separable Banach space into the given logic. The structuralisation of the set of observables is carried out by means of the classical Loomis–Sikorski theorem. The notion of the spectrum enables to understand the set of observables as a Banach space. The last part of the chapter introduces the notion of the mean value of the observable, which is a basis for the study of the stochastic properties of quantum logics.

Chapter 5: Joint Probability Distribution of the Observables. This is the most extensive chapter that links up immediately to the results of the foregoing chapters. Joint distributions are studied here on the structures with a weakened compatibility condition. Above all, two types of generalized joint distributions are discussed here, namely the Gudder and Urbanik types. The character of the chapter is a stochastic one. The authors follow here a number of their own results.

Chapter 6: Fundamentals of the Generalized Probability Theory. The chapter outlines the possibilities of constructing probability theories on quantum logics. The presented considerations are in many cases analogical to the classical ones, nevertheless the results are nontrivial. The chapter deals with special types of convergences, laws of large numbers, stochastic processes and random measures on logics.

Chapter 7: Projector Logics of the Hilbert space and the Elementary Proof of Gleason's Theorem. The chapter discusses one of the most important cases of logics applied in the present models of quantum mechanics. Some statements at the end facilitate the study of the two previous chapters.

On the whole, it can be said that the book is written in a very understandable and rigorous way. Probably, it represents nowadays the only comprehensive monograph in the field of quantum logics theory that includes the results of the latest research. From the standpoint of the articulation it can

be regarded as a not only valuable top work but at the same time as a textbook that after its prospective translation into English could play a very positive role in the propagation and development of quantum logics theory in our country as well as abroad.

Blahoslav Harman, Liptovský Mikuláš

Bolt, J., Barta, E.: **METHODOLOGICAL PROBLEMS OF A BIOLOGICAL EXPERIMENT**, Veda, Bratislava 1988, 320 pp. (Slovak; Russian and English summaries.)

The structure of the book is exceptional due to summarizing knowledge from different scientific disciplines connected with biological experiments. The authors define usually intuitively used notions, such as principle, law, phenomenon, biological system and further notions from biophysics and thermodynamics. Stochasticity, e.g., is widely treated in the book. The theory of hypothesis estimation and testing are the basis of the chapter devoted to biostatistics.

Formally, there are four chapters in the book, namely Methods of study of biological phenomena, Biological phenomena laws, Empiricism, experiment and measurement, and Methodological problems of biostatistics.

There are several reasons for a mathematician's interest in this work. First, we see that mathematical knowledge from different fields are necessary for biological research. A slight superficiality in the using of mathematical notions is understandable. However, reading the book, one can observe that only few aspects of mathematical knowledge are interesting from the biological point of view. Also, the book is illustrated by many examples of experimental data and their processing.

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