

Khrennikov, Andrei

Non-archimedean analysis: quantum paradoxes, dynamical systems and biological models.
(English) [Zbl 0920.11087](#)

Mathematics and its Applications (Dordrecht). 427. Dordrecht: Kluwer Academic Publishers. xvii, 371 p. (1997).

The book is devoted to non-archimedean models in physics, biology and social sciences. The author starts (Chapters I and III) from an exposition of elementary p -adic analysis (sometimes m -adic numbers are also used, where m is not a prime number). Simultaneously (Chapter II) a review of the foundations of quantum mechanics is given, including the Einstein-Podolski-Rosen paradox, the Bell inequality and the problem of hidden variables.

Chapters IV, VI and VII are devoted to a model of quantum mechanics with p -adic-valued wave functions and the ideas proposed by the authors in order to resolve quantum paradoxes on the basis of the p -adic interpretation of the measurement process. An essential tool is the author's concept of the p -adic-valued probability (expounded in Chapter V).

Chapter VIII contains an investigation of some simple p -adic dynamical systems used as toy models for human subconscious, social dynamics, human history, and even God (Section VIII.10 is entitled "God as a p -adic Dynamical System").

At present nobody knows whether the models invented by the author can develop into realistic descriptions of physical, biological or social phenomena. However, the book can help non-mathematicians to obtain some knowledge of non-archimedean analysis and its possible applications.

Reviewer: [Anatoly N.Kochubei \(Kiev\)](#)

MSC:

- [11Z05](#) Miscellaneous applications of number theory
- [81P05](#) General and philosophical questions in quantum theory
- [58-02](#) Research exposition (monographs, survey articles) pertaining to global analysis
- [91-02](#) Research exposition (monographs, survey articles) pertaining to game theory, economics, and finance
- [92-02](#) Research exposition (monographs, survey articles) pertaining to biology
- [47S10](#) Operator theory over fields other than \mathbb{R} , \mathbb{C} or the quaternions; non-Archimedean operator theory
- [60A05](#) Axioms; other general questions in probability
- [11S80](#) Other analytic theory (analogues of beta and gamma functions, p -adic integration, etc.)
- [46-02](#) Research exposition (monographs, survey articles) pertaining to functional analysis
- [46S10](#) Functional analysis over fields other than \mathbb{R} or \mathbb{C} or the quaternions; non-Archimedean functional analysis
- [60-02](#) Research exposition (monographs, survey articles) pertaining to probability theory
- [91E10](#) Cognitive psychology

Cited in **6** Reviews
Cited in **165** Documents

Keywords:

p -adic number; m -adic number; p -adic valued probability; p -adic dynamical system; quantum paradox; hidden variable; non-archimedean models; model of quantum mechanics; p -adic-valued wave functions

Software:

[Mathematica](#)