



Nature's Longest Threads: New Frontiers in the Mathematics and Physics of Information in Biology

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Organisms endowed with life show a sense of awareness, interacting with and learning from the universe in and around them. Each level of interaction involves transfer of information of various kinds, and at different levels. Each thread of information is interlinked with the other, and woven together, these constitute the universe — both the internal self and the external world — as we perceive it. They are, figuratively speaking, Nature's longest threads. This volume reports inter-disciplinary research and views on information and its transfer at different levels of organization by reputed scientists working on the frontier areas of science. It is a frontier where physics, mathematics and biology merge seamlessly, binding together specialized streams such as quantum mechanics, dynamical systems theory, and mathematics. The topics would interest a broad cross-section of researchers in life sciences, physics, cognition, neuroscience, mathematics and computer science, as well as interested amateurs, familiarizing them with frontier research on understanding information transfer in living systems.

Contents:

- Mathematics In-forms Physics and Physics Per-forms Mathematics: Comments (*N Kumar*)
- An Incomplete Summing Up of Quantum Measurements (*N D Hari Dass*)
- Predictive Information for Quantum Bio-Systems (*Arun Kumar Pati*)
- Quantum Effects in Biological Systems (*Sisir Roy*)
- Instabilities in Sensory Processes (*J Balakrishnan*)
- Active Cellular Mechanics and Information Processing in the Living Cell (*M Rao*)
- On the Importance of Length Scales in Determining the Physics of Biological Systems (*B Ashok*)
- q -Deformations and the Dynamics of the Larch Bud-Moth Population Cycles (*Sudharsana V Iyengar and J Balakrishnan*)
- Newtonian Chimpanzees? A Molecular Dynamics Approach to Understanding Decision Making by Wild Chimpanzees (*Matthew Westley, Surajit Sen and Anindya Sinha*)
- Quantum Probability — A New Direction for Modeling in Cognitive Science (*Sisir Roy*)
- Knowledge, Its Hierarchy and Its Direction (*Apoorva Patel*)
- Some Remarks on Numbers and Their Cognition (*P P Divakaran*)
- Conceptual Revolution of the 20th Century Leading to One Grand Unified Concept — The Quantum Vacuum (*B V Sreekantan*)
- Classical Coherence, Life and Consciousness (*Partha Ghose*)
- Consciousness — A Verifiable Prediction (*N Panchapakesan*)
- Gödel, Tarski, Turing and the Conundrum of Free Will (*Chetan S Mandayam Nayakar & R Srikanth*)
- Mathematics and Cognition (*Rajesh Kasturirangan*)

Readership: Researchers in life sciences, physics, cognition, neuroscience, mathematics and computer science, as well as general public interested in understanding information transfer in living systems.

Key Features:

- This book shows how at each level, differing physics concepts and mathematical tools may be used to model and understand information transfer and its processing

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