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Titolo	Complex and Adaptive Dynamical Systems [[electronic resource]] : A Primer // by Claudius Gros
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ISBN	3-319-16265-9
Edizione	[4th ed. 2015.]
Descrizione fisica	1 online resource (XVI, 422 p. 163 illus., 132 illus. in color.)
Collana	Springer complexity
Disciplina	515.352
Soggetti	Physics Computational complexity System theory Statistical physics Vibration Dynamical systems Dynamics Applications of Graph Theory and Complex Networks Complexity Complex Systems Applications of Nonlinear Dynamics and Chaos Theory Vibration, Dynamical Systems, Control
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Bibliographic Level Mode of Issuance: Monograph
Nota di contenuto	Graph Theory and Small-World Networks -- Bifurcations and Chaos in Dynamical Systems -- Dissipation, Noise and Adaptive Systems -- Self-Organization and Pattern Formation -- Complexity and Information Theory -- Cellular Automata and Self-Organized Criticality -- Random Boolean Networks -- Darwinian Evolution, Hypercycles and Game Theory -- Synchronization Phenomena -- Elements of Cognitive System Theory -- Solutions -- Index.
Sommario/riassunto	This primer offers readers an introduction to the central concepts that form our modern understanding of complex and emergent behavior, together with detailed coverage of accompanying mathematical

methods. All calculations are presented step by step and are easy to follow. This new fourth edition has been fully reorganized and includes new chapters, figures and exercises. The core aspects of modern complex system sciences are presented in the first chapters, covering network theory, dynamical systems, bifurcation and catastrophe theory, chaos and adaptive processes, together with the principle of self-organization in reaction-diffusion systems and social animals. Modern information theoretical principles are treated in further chapters, together with the concept of self-organized criticality, gene regulation networks, hypercycles and coevolutionary avalanches, synchronization phenomena, absorbing phase transitions and the cognitive system approach to the brain. Technical course prerequisites are the standard mathematical tools for an advanced undergraduate course in the natural sciences or engineering. Each chapter includes exercises and suggestions for further reading, and the solutions to all exercises are provided in the last chapter. From the reviews of previous editions: This is a very interesting introductory book written for a broad audience of graduate students in natural sciences and engineering. It can be equally well used both for teaching and self-education. Very well structured and every topic is illustrated with simple and motivating examples. This is a true guidebook to the world of complex nonlinear phenomena. (Ilya Pavlyukevich, Zentralblatt MATH, Vol. 1146, 2008) Claudius Gros' Complex and Adaptive Dynamical Systems: A Primer is a welcome addition to the literature. A particular strength of the book is its emphasis on analytical techniques for studying complex systems. (David P. Feldman, Physics Today, July, 2009) .
