

1. Record Nr.	UNINA9910293141303321
Autore	Svozil Karl
Titolo	Physical (A)Causality [[electronic resource] ] : Determinism, Randomness and Uncaused Events // by Karl Svozil
Pubbl/distr/stampa	Springer Nature, 2018 Cham : , : Springer International Publishing : , : Imprint : Springer, , 2018
ISBN	3-319-70815-5
Edizione	[1st ed. 2018.]
Descrizione fisica	1 online resource (XIV, 219 p. 32 illus., 24 illus. in color.)
Collana	Fundamental Theories of Physics, , 0168-1222 ; ; 192
Disciplina	530.01
Soggetti	Physics Mathematical physics Epistemology Probabilities Philosophy and science History and Philosophical Foundations of Physics Theoretical, Mathematical and Computational Physics Probability Theory and Stochastic Processes Philosophy of Science
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Part I Embedded observers, reflexive perception and representation: Intrinsic and extrinsic observation mode -- Embedded observers and self-expression -- Reflexive measurement -- Intrinsic self-representation -- Part II Provable unknowns: On what is entirely hopeless -- Forecasting and unpredictability -- Induction by rule inference -- Other types of recursion theoretic unknowables -- What if there are no laws? Emergence of laws -- Part III Quantum unknowns: "Shut up and calculate" -- Evolution by permutation -- Quantum mechanics in a nutshell -- Quantum oracles -- Vacuum fluctuations -- Radioactive decay -- Part IV Exotic unknowns: Classical continua and infinities -- Classical (in)determinism -- Deterministic chaos -- Partition logics, finite automata and generalized urn models -- Part V Transcendence: Miracles -- Dualistic interfaces -- Part VI Executive

summary: Executive summary -- Appendix A: Formal (in)computability and randomness -- B: Two particle correlations and expectations.

---

## Sommario/riassunto

This book is open access under a CC BY 4.0 license. This book addresses the physical phenomenon of events that seem to occur spontaneously and without any known cause. These are to be contrasted with events that happen in a (pre-)determined, predictable, lawful, and causal way. All our knowledge is based on self-reflexive theorizing, as well as on operational means of empirical perception. Some of the questions that arise are the following: are these limitations reflected by our models? Under what circumstances does chance kick in? Is chance in physics merely epistemic? In other words, do we simply not know enough, or use too crude levels of description for our predictions? Or are certain events "truly", that is, irreducibly, random? The book tries to answer some of these questions by introducing intrinsic, embedded observers and provable unknowns; that is, observables and procedures which are certified (relative to the assumptions) to be unknowable or undoable. A (somewhat iconoclastic) review of quantum mechanics is presented which is inspired by quantum logic. Postulated quantum (un-)knowables are reviewed. More exotic unknowns originate in the assumption of classical continua, and in finite automata and generalized urn models, which mimic complementarity and yet maintain value definiteness. Traditional conceptions of free will, miracles and dualistic interfaces are based on gaps in an otherwise deterministic universe. .

---