

# BOOK JACKET MATERIAL FROM INFORMATION MECHANICS

## A NEW FOUNDATION

This is a beginning—an introduction to a starkly elegant conceptual and calculational foundation for physics—a basic theory that concisely subsumes and is independent of previous approaches. It offers fundamental new concepts for physics, astronomy, cosmology, and mathematics; a foundation for future philosophic investigations of meaning, objective reality, mind, linguistics; and new technologies.

Frederick W. Kantor develops and presents both the concept and tools necessary for its use. His is a creator's insight, giving a unified picture of space, time, relativity, quantum mechanics, gravity, electromagnetism, "strong interaction", and neutrinos, not blending previous superstructures, but introducing a new and basic approach.

This new conceptual basis looks at physics by keeping track of amounts and representations of information. It is guided, in part, by the fundamental insight that physics must deal with, and only with, all of the information accessible to an observer. It explores aspects of a physical picture in which information represented by physical systems appears fundamental, and explains how it may be formalized.

INFORMATION MECHANICS provides much of the conceptual basis and formal methods, to date, of an interesting new path of inquiry. The presentation can be followed without extensive prior background, although such background is necessary for a critical review of some formal derivations. The reader—physicist, inventor, biophysicist, mathematician, logician, electrical engineer, information scientist, biologist, philosopher, astronomer, astrophysicist, professor, or student—is introduced to a new picture of his/her universe. Here, this material stands starkly delineated—an immensely powerful new tool set forth and explained by the person who created it—to be examined and explored by those who will build on it in the future.

## About the author

FREDERICK W. KANTOR is an inventor and physicist. His many patents and publications have included basic principles in thermodynamic technology, research instruments in X-ray optics and X-ray astronomy, electronics, communications, information processing, and others. For some of his work in X-ray optics and X-ray astronomy, he received a Ph.D. in Physics from Columbia University.

He has consented to share, by way of this monograph, much of an ongoing inquiry.

## STEP BY STEP

Where does one begin to explain or understand a conceptual picture? Here is a step-by-step presentation in which ultimately only concepts relating to information remain as basic.

Section 1 is an overview, presenting informally and with suitable cross-references, material treated more formally in subsequent sections.

Section 2 uses a sequence of information bookkeeping theorems to obtain: a set of conditions under which an observer can not know he is moving, and thus special relativity and a limitation on its domain of applicability; inertia; some properties of representation of information by light, and thus a "cosmological red shift" in a universe with "constant size", and from that "Hubble's constant"  $H$ ; conditions under which an observer can not know that his localization has been changed by nearness to mass, and thus curvature of spacetime about mass, gravity, and the weak field gravitational "constant"  $G$ ; detailed formal consideration of the least massive information representation stable when nearly at rest, and thus the electron and positron, and approximate values for their mass and charge, and for the "fine structure constant"; approximate values for the total mass, radius, density, total amount of information, and energy per bit of information in our universe; and some insight into neutrinos.

Section 3 discards the original basis in part of electromagnetic theory and nonrelativistic quantum mechanics and proceeds by postulating *only that information is conserved, communicable, and finitely accessible*. From this are obtained conceptually and formally: four dimensional spacetime, apparent unidirectionality and distinctness of time; isotropy and homogeneity of the remaining 3-space; Maxwell's equations in vacuum; and conceptual and formal bases for mass, energy, a quantized electromagnetic theory, and a relativistic quantum mechanics. This provides a basis for an axiomatic form of the theory as part of which various derivations appearing in Section 2 are taken over intact. *This axiomatic form uses only four numerical quantities*: total amount  $I_U$  of information in universe  $U$ ; linear size  $R_U$  of  $U$ , calibrating length units; local velocity  $c$  of light, calibrating time units in terms of length units; and energy  $E_1$  per bit of information in  $U$ , for convenience in using instruments calibrated in energy or mass units.  $G$ ,  $\alpha$ ,  $H$ , "Planck's constant"  $h$ , etc., appear as derived quantities. Also, as a partial test of this axiomatic form, approximate values for "rest masses" of what appear to be the lightest sixteen "elementary" particles are systematically calculated, and what appears to correspond to the "strong interaction" is derived.

The remaining three sections provide a variety of interesting comments based on this physical picture; predictions and a table of suggested experiments; and a list of ongoing questions that suggest research directions. The appendices include conjectures about solar neutrinos, provide a working reference to help follow derivations, list abbreviations, and include a map of the logical sequence of formal statements. Together this material provides direction for future research and studies.

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