

Helmut Tributsch

Time Arrow

as Trace of Energy

Logical Key to a Spiritual Universe

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The time of the time arrow is the flow of action caused by energy.

Nature is the self-realization of energy through time.

The time arrow is the loss of information about the past.

Dedicated to all those who have not ceased to trust
that nature is to be understood logically.

Thanks to my wife Barbara, who went through the text with me
and tirelessly questioned its comprehensibility.

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Foreword

I wrote this book because, due to my experience with nature, I became convinced that science, with all its significance and successes in modern life, and with all the fascination it radiates, has come to be on a problematic course. It is a wrong path which, in my opinion, has serious consequences for society, education and the development of bio-analog technologies.

A century ago, within the framework of quantum theory and Relativity Theory, science began to accept irrational scientific ideas and conclusions that are contrary to human experience and to apply them to many natural phenomena. This created an environment of tolerance for “non-understanding”. This “non-understanding” now permeates science as a web of established theories that contradict human logic. This overriding of human reason could be a cause that prevents us from logically recognizing upcoming problems and also from successfully reproducing the fascinating energy technologies of biology. It could also distract us from the fact that a convincing idea of nature must also include an explanation of intelligence and consciousness and their evolution. Without a research strategy based on rational principles, we will never properly understand the reality of our universe, nor why evolution has given man an instinct for rationality and confidence in causality.

The reality in today's science tells a different story. The trend towards irrationality is underpinned by an increasing number of abstract and largely opaque physical-mathematical models. More and more incomprehensible theories are currently being proposed to further support the irrational construction of knowledge. Everything in our real environment changes in one direction, following a time arrow. Only the current natural sciences describe and explain the building blocks of nature as time-neutral and design their fundamental laws in such a way that they are reversible in time. Conceptions of non-causality, of effects without causes, of non-locality, of objects simultaneously located in two places, and of an empty space manipulating movement and time are already established. There are others, include the Big Bang scenario about the origin of the universe, mysterious energy appearing from nowhere, an enormous inflation of empty space, and time travel. Dark matter, dark energy and an ever faster expanding universe with galaxies whose flight is approaching the speed of light are currently confusing our ideas. Does nature really behave that strangely, acting as a “block universe”, where time is an illusion? Are essential fundamental mechanisms of nature really illogical? Or is it, as I

suspect, that science relies on irrational explanations because it does not know any other answers while insisting on a time-neutral world? If this is so, science is really on the wrong path; it is drawing the universe as it does not really exist.

As a boy growing up in a small mountain village in the region called Friuli, located in north-eastern Italy, I learned early that there was little future in cultivating this harsh, rocky land. The alternative was to leave the place and learn a modern profession. Because I was fascinated by nature, I wanted to understand it. That's how I became a natural scientist. Science gave me satisfactory answers to many questions. At the same time, however, it created deep confusion as it also insisted on irrational explanations for relevant fundamental mechanisms.

Is nature really irrational in its approach to such fundamental phenomena as causality? Are space and time really interwoven and manipulated by matter? Can energy and particles actually emerge from nothing? If this fundamental irrationality were part of nature, why don't we experience illogical situations in any of the fantastic technological developments in living nature? There, everything that was discovered and investigated is ultimately logically understandable. There is no room for irrational mechanisms. Were such mechanisms invented by physical science due to lacking comprehension?

If one assumes that irrationalities arise from a lack of information in connection with scientific theories, then one has to deal with the applied notion of energy. The reason is clear: Information requires energy. If information is missing, then energy is missing or it is not being handled properly. It can be concluded that essential theoretical models concerning energy-relevant issues are incomplete or wrongly designed. Passive energy and time neutrality also seem to lead to a dead end because energy turnover generates movement and change. The search for inconsistencies in our established energy concept thus became the key to my intellectual challenge and the basis of a working strategy.

So in this book I will begin with a brief excursion into the history of scientific thinking about energy. I discovered a contradiction in it and so I propose a change in the idea of how energy behaves. Energy should not, as currently defined, only have the ability to perform work. Rather, it should also have the tendency or intention to do so. This seems to be only a small transformation, but in reality it is a radical change in the fundamental models of thought. It's a change of paradigm. We then no longer have to deal with a time-neutral world in a state of equilibrium, in which all fundamental processes in time are reversible, as has been scientifically formulated so far. Instead, the world becomes fundamentally irreversible, following an energy-driven

time arrow. Everything is oriented in time. Energy turnover produces action and “effects” the progress of time. Time is a flow of action. This is what determines the “before” and “after” in our world and ultimately makes possible the self-organization of energy and matter, the creative power of our universe, through processes of feedback in the first place. Time would thus not only be a development in the direction of greater probability, greater disorder, as it is assumed today in physics, but the effective time arrow would be the trace which the energy, the energy turnover, left behind, leaves behind or will leave in the environment. Such a time arrow does not function with an “disinterested” energy; instead, it requires dynamic energy properties. I will actually show that the very fundamental principle of least action, which forms the basis of many laws of nature, leads to exactly the same conclusion of a directed world and a time arrow as trace of energy when mathematically re-evaluated and dynamically understood.

If one consistently explores different areas of natural science with this idea in mind, one realizes that one after the other of the existing irrationalities and paradoxes ceases to apply and can be eliminated. A key element here is also the necessary reinterpretation of the particle-wave dualism in quantum physics. The dynamic property of energy causes matter to change from particle form to wave form. However, the quality of the energy in a small particle and in a widespread wave is not identical. Here I uncover a fundamental error of traditional quantum theory. Energy is distributed in the waveform and needs information to be transformed back into the concentrated particle form. I call this information about the energy distribution in a modified, dynamic quantum state the “information image of matter”. It must be provided to maintain a “dynamic” particle-wave duality, contains energy and, because it surrounds all particles, turns out to be the phenomenon of gravity.

Following from this, this information about matter eliminates previously incomprehensible irrationalities. Surprisingly, it can also explain the always-constant speed of light as a local phenomenon of light. The necessity of postulating a four-dimensional space-time world that is also supposed to manipulate reality and to control the speed of light is eliminated. This amazing result removes further irrationalities. As a consequence, the cosmic redshift of stellar light and the Big Bang explosion of the universe are investigated under the above-mentioned conditions and understood in a simple way. Spreading, propagating light generates entropy, i.e. it loses usable energy, which dynamic quantum physics allows, but not the historically grown, time-neutral one. This will make it possible to propose an alternative model for the formation and function of the universe, an “image universe” for the 500 billion galaxies identified to date.

The topics considered also deal with evolution and the question of how spontaneous mutations can lead to highly developed, intelligent life in the long term. The conclusion from my studies is that, contrary to the currently predominating understanding, biological evolution has a goal. This goal is determined by the tendency of self-organized systems to maximize their energy or entropy turnover. Genetic mechanisms overlay and had to cope with this directed characteristic of life.

This makes the remarkable dynamics of nature much easier to understand and it can be explained above all by rational models of thought. This result gives credibility to the proposed dynamic understanding of energy and nature and opens the way to a new front: our mind and consciousness can be understood as a straight forward consequence of dynamic energy and the time arrow. Dynamic energy and the urge of self-organized systems towards maximum energy turnover enable the self-organization of information and thus generate a kind of “living information” of consciousness and mind. We are dealing with a hierarchy of information processing that is above that of pure computing as we know it from computers. In the end it can even be demonstrated that the development of the mind can be regarded as the true goal of evolution. Such a surprising result changes almost everything we believe and currently understand in connection with the meaning and function of the universe and the role of humanity in it.

Helmut Tributsch

Abstracts of the Chapters

ORIGIN AND CHALLENGE OF IRRATIONAL IDEAS

Chapters 1-6:

The first chapters cover irrationality in important physical theories and use philosophical considerations to deal with them. The first problem points are identified.

1 Irrationality in Physics and in Society

Evolution has endowed man with a sense of rationality. Nonetheless, science has been trying for a hundred years to convince us that nature contains essential irrational elements with quantum physics, the Theory of Relativity, and cosmology (effect without cause, four-dimensional space-time, time travel, etc.).

2 Tools for Understanding Nature

What do philosophers say about recognizing nature? The idea of Ernst Cassirer, a follower of the Kant School, of “symbolic forms”, a logical tool one needs, opens up a useful approach.

3 Knowledge with Contradictory Symbolic Forms?

Since quantum physics and classical physics are not compatible, the symbolic forms used to recognize nature are not compatible either.

4 How to Deal with Irrationality?

It is assumed that information is missing for the rational cognition of quantum physics (contrary to what quantum physics claims). Since information requires energy, there would have to be a difference in the energy concept in classical physics and quantum physics.

5 Two Types of Energy Properties

In fact, there is a difference in the laws of energy between classical physics and quantum physics. In quantum physics the energy retains its ability to work, even if strongly diluted, but in classical physics it does not.

6 Energy Dilution in Space and Its Consequences

This section uses various examples to explain how energy loses its ability to work when diluted in space.

DYNAMIC ENERGY: PARADIGM SHIFT TOWARDS RATIONALITY

Chapters 7-16:

The next chapters serve to define necessary changes (time orientation as a fundamental property of nature, diluted energy not equivalent to concentrated energy). On this basis these chapters address the irrationalities in quantum physics (effect without cause, particles simultaneously in two places, etc) and explain how they can now be overcome. This is done via an extended model of the quantum state.

7 A Dynamic Idea of Energy: Why?

How far does one have to go when there is a change in the idea of energy in order to understand nature rationally? Four arguments are put forward that explain why we need a Dynamic Energy, an energy that drives time.

8 Observations on Entropic Time Orientation and Information

The idea of time-neutral particles and a statistical time arrow now represented in physics is based on calculations in which information is thrown away for simplification, but information contains energy. This changes the formula in such a way that it turns time-reversible mechanisms into time-oriented mechanisms. In reality, it's mathematical manipulation.

9 The New Energy Theorem

Here, in contrast to conventional physics, which defines energy as a number that has no interest in doing work, a Dynamic Energy is proposed: it has interest in doing work and tries to reduce its presence per state, i.e. its information content (essentially what we observe in our environment anyway).

10 The Reduction of Energy per State and the Principle of Least Action

It is shown that a Dynamic Energy can actually be derived from the principle of least action, on which essential laws of physics are based. It also explains how classical physics used mathematical manipulation to derive useful laws of motion from an energy that is only a number.

11 Thermodynamic Laws are Consequences of the Time Arrow

From the newly defined Dynamic Energy, the second law of thermodynamics can be derived without difficulty (which is not possible within the classical framework of physics). In addition, an entropy law for self-organized systems (such as life) is given. These approach maximum entropy production.

12 How Did Quantum Physics Become Irrational?

Quantum physics became irrational because particles (concentrated energy) and waves (widely distributed energy) are equated in their duality.

13 How Can Quantum Paradoxes Be Overcome?

The particle-wave dualism must be formulated differently on the basis of a Dynamic Energy. Since the energy in the wave has less ability to do work, information must be set aside in order to regenerate the particle state. That means that one also needs information about matter in addition to the plain description of matter alone (so an information image of it).

14 What Does Quantum Indeterminacy in Nature Mean?

Since Dynamic Energy allows self-organization without any problems, elementary particles are described as self-organized energy. The statistical appearance of quantum physical phenomena is interpreted by chaotic deterministic mechanisms. There is no effect without a cause. Quantum indeterminacy is a chaotic phenomenon and deterministic.

15 Paradoxes Can Be Eliminated

The famous double-slit experiment is explained logically for the first time. This is possible because time orientation is now a fundamental property.

16 What Can Be Said in General About Non-Locality?

The non-locality, from which it is derived that a particle can be in two places at the same time, can be explained very differently in a logical way. It is simply information exchange which erroneously mimics nonlocality. The tunnelling phenomenon and Schrödinger's cat are also logically explained.

RETURN TO A CREDIBLE COSMOLOGY

Chapters 17-24:

Here it is shown that the information image of matter introduced in this book can explain the observed always-constant speed of light. One does not have to assume a four-dimensional space, which produces the constant speed of light out of itself, as has been done thus far in the Theory of Relativity. This eliminates the many irrationalities of Relativity Theory. Gravity is also interpreted via the information image of matter and the redshift of stellar light as an entropy phenomenon is put up

for discussion. Since the current picture of the universe results from conventional quantum physics and the Theory of Relativity, it must be largely questioned.

17 The Always-Constant Speed of Light: What Exactly Does it Mean?

The paradox of an always-constant speed of light has led to the Theory of Relativity, which defined a four-dimensional space as being responsible for all of this.

18 Four-Dimensional Spacetime: An Illusion

The information image of matter defined for the new particle-wave dualism can explain the always-constant speed of light and is itself gravity. You don't need a space that bends and manipulates time. The incredible assertions of the Theory of Relativity are scrutinized and they turn out to be superfluous.

19 Time Travel: Endless Paradoxes

The irrationalities arising from time travel are discussed. It is shown why there can be no time travel.

20 Elementary Particles and Fundamental Forces

Elementary particles are interpreted as self-organized matter in a way that is completely different from the Standard Model. The fundamental forces support the energy in reducing its presence per state.

21 Gravity: Information Image of Matter

The information image of matter supporting particle-wave duality must be measurable around matter and grow with its presence. It is recognized to be gravity. Gravity is therefore information about the behavior of matter as determined by natural laws.

22 Cosmological Redshift: The More Logical Interpretation

Quantum physics does not allow photons emitted by stars to lose energy without colliding with matter or interacting with gravity. However, light radiation would have to emit and lose energy in the form of entropy when diluted. The new interpretation of the quantum state makes this possible and thus relativizes the current model of the exploding universe.

23 The Irrationality of the Big Bang

The different irrational assumptions in connection with the Big Band theory are discussed and compared to the new interpretation of the universe.

24 Cosmic Objects from Galaxies to Black Holes

Black holes and their associations with quasars are reinterpreted on the basis of the dynamic idea of energy. Since gravitation is understood as information about matter, black holes are information turbines for the fragmentation of matter. Quasars help to achieve maximum energy (entropy) turnover.

TIME, EVOLUTION AND SPIRIT

Chapters 25-30:

In a fundamentally time-oriented world, the dynamic self-organization of galactic systems and of life can be directly explained. It can be shown that self-organized systems compete for maximum energy turnover. Therefore, more and more energy is converted when the restrictions are relaxed. Information (which has an energy content) can also organize itself. This, for information in the brain, is interpreted and discussed as consciousness.

25 An Alternative Short History of Time

Time is not an illusion, as physics claims today — it is the trace that energy turnover leaves behind in us and our environment. Energy turnover produces a flow of action, energy times time, the new “action time”. Alternatively, this new time means “loss of information about the past”. The clock time can be averaged and calibrated from action time, but it only acts as a scale independent of energy turnover and is determined by natural constants.

26 The Time Arrow and the Self-Organization of Matter

This energy-driven time arrow allows for the self-organization of matter without problems, because there is a “before” and an “after”, a prerequisite for feedback.

27 Evolution: The Goal is High Energy Turnover and Progression of Mind
Self-organized systems tend towards maximum energy and entropy turnover. If these compete with each other, the given restrictions decrease and the energy turnover of the successful system gradually increases. High energy turnover also enables the self-organization of information.

28 Self-Organization of Information: Consciousness

Since information has an energy content, information can also self-organize in a Dynamic Energy world. This is interpreted as consciousness. Its evolution, characteristics and behavior are discussed.

29 The Genetic Code Self-Organized

Chemical information can also be self-organizing. This explains why life gets by with a rather low storage capacity for information in the genes and why information can multiply in life processes.

30 Evolution and Function of the Universe

The newly proposed image of the cosmos is presented here. The depleted universe is ultimately reborn through the information image of matter, which is acting as gravity.

MANKIND ON THE PATH OF THE TIME ARROW

Chapters 31-35:

These chapters concern an analysis of the situation of humanity with its increasing energy demand and an evaluation of the monetary and financial economy on the basis of the new energy theory. They explain, what new concept of the world und the universe, as well its regularities people would be facing. Evolution with an aim, a universe without space-time and information and spirit, self-organized information, that control matter make a significant difference.

31 The Energy Challenge for Mankind

According to the developed considerations, the evolution of mankind aims at more and more energy turnover. This is a major challenge in terms of destroying the environment. The parallel evolving human spirit should get this under control.

32 Money as an Equivalent of Energy

The Dynamic Energy model explains the laws of the monetary economy in a much better way.

33 What Is the Equivalent of Securities Trading and Finance?

The information image of energy also seems to explain surprisingly well the financial economy based on speculation (information).

34 A World View Without Irrationalities

This chapter summarizes which irrationalities the new “symbolic forms” for recognizing nature were able to eliminate.

35 Evolution, Mind Included

The presented Dynamic Energy model provides the first materialistic theory that can explain the evolution of mind. It leads to a friendlier, constructive universe.

A RATIONALLY UNDERSTANDABLE NATURE

Chapters 36-39:

These chapters show which irrationalities would disappear from our world view today. It is also the first materialistic theory that can explain the mind with its intelligence and future orientation as part of evolution. A summary of the most important consequences of a Dynamic Energy world is given, including an analysis of the impact on the dispute between science and religion. The philosophical current of Panpsychism, which has flared up again and again for two and a half millennia, defines the conceptual framework within which the considerations on the time arrow led as a trace of energy.

36 What Can We Learn from a Dynamic Energy World?

It is demonstrated that the assumption of a temporally oriented world eliminates about ten essential paradoxes and irrationalities from scientific theories. The world can be explained rationally, but only if one understands that it is time-oriented. This energy-driven time arrow can be seen directly in the developing environment.

37 A New Understanding of Time and the Fate of Humanity

Here a summary is given of how the energy-powered time arrow can be understood and works. It is shown how human civilization has in the course of its development actually removed many restrictions imposed by the environment and is converting more and more energy. It would inevitably be destroyed by a gradually degrading environment if it does not resolutely and with intellectual and spiritual commitment steer away from such destruction.

38 Notes on the Dispute Between Science and Religion

It is explained what the proposed ideas achieve in the controversy between science and religion. They could overcome essential conflicts by showing that the up-to-date world view of natural science is by no means very logical, and that the new perspective described here does not contradict religion.

39 The “Panpsychism” or the Eternal Riddle of Spirit in Nature

This philosophical idea of spirit within natural processes, which has flared up again and again for two and a half millennia, defines the framework within which the thoughts worked out here on a purely materialistic basis belong.

40 Concluding Remarks

The difficulties of bringing a radically new idea to the table are laid out.

ORIGIN AND CHALLENGE OF IRRATIONAL IDEAS

1 Irrationality in Physics and in Society

I am convinced that evolution and nature itself have impressed rational thinking on man. For those who did not think or act rationally, the risk of failure and elimination was significantly higher. An important basis for action patterns has always been causality, because every effect has a cause. Apparently, energy laws are included in this process. Energy must flow to bring about change. Causality simply reflects the behavior of energy in terms of change. The laws that control nature seem to follow rational rules. Man had to adapt to them. He observed nature and reacted accordingly. Rational thinking is bio-analog thinking — it follows the laws of nature. Organisms in nature obey rational laws. Why should inorganic, inanimate phenomena such as quantum processes or empty space be an exception? When early philosophers set out to explore the mechanisms of nature more thoroughly, they chose the path that rational thought offered towards a deeper understanding. Among the various possibilities, they chose the rational ones and eliminated the irrational ones. The opinion expressed in this book agrees with the conclusions of important philosophers. In his “Critique of Pure Reason” Immanuel Kant (1781) said that “all changes happen according to the law of the connection between cause and effect”. The philosopher of science Karl Popper (1997) confirms that “the belief in causality is obviously genetic and a priori”. It was given to us through evolution.

A perfect example of rationality and logic is mathematics. Physicists are convinced that all natural phenomena can be described by it. Let us consider a complex mathematical treatise with many rational calculation steps, which should lead to an expected result. If only a single step were irrational or mathematically wrong, the entire mathematical effort would fail. The result would be wrong and nobody would doubt it. If physical reality can be described by mathematics, why should it be allowed to introduce irrational mechanisms that contradict logic, such as non-causality, time travel, or the inflation of empty space? Either the mathematical architecture of physics or the presence of irrational mechanisms that are combined with rational mechanisms in physics should encounter problems here. The acceptance of irrationality in science should therefore be viewed as a development along a wrong path. I want to show in this book that this is indeed the case.

For many centuries, scientists have searched for logical explanations for processes that take place in nature. However, quantum theory and Relativity Theory at the beginning of the twentieth century radically changed the situation. Irrationality, supported by complex mathematical models that few interested people can even evaluate, became acceptable. The Theory of Relativity, which was essentially developed by Einstein, inspired amazement with a time and with objects that could be manipulated. The culmination was the introduction of a four-dimensional space-time that seemed to control both the movement of objects and the flow of time, making the universe very special. Humans were confronted with a theoretically created world, which was not compatible with their real experience, i.e. not shaped by evolution. Quantum theory followed with its irrationalities. It began rationally with Max Planck's successful interpretation of the radiation from a heated black body and Einstein's interpretation of the emission of electrons from solid surfaces. Quantum theory was then advanced by numerous scientists. Among them were personalities such as Sommerfeld, Born, Bohr, Schrödinger, de Broglie, Pauli, Heisenberg and Dirac, who in principle all tried to adapt mathematical formalism to experimental quantum results. The outcome was amazing. Einstein himself had the feeling that he could not follow it. For example, he did not want to accept that the principle of causality should be abandoned; he wrote to Max Born: "the thought that an electron exposed to a beam freely chooses the moment and the direction in which it wants to jump away is unbearable to me" (Daecke, 1991). But quantum theorists insisted that there was no cause for quantum phenomena such as the decay of an unstable particle or a radioactive atom. Only statistical statements could be made. It is fundamentally impossible to obtain more information about such a process. But quantum theory produced even more irrational surprises. An object, for example an elementary particle, could be in two different places at the same time. A kind of instantaneous information transfer between distant members of a quantum system could take place. The assertion that a particle would only exist if it were measured was also enforced.

Ideas from the quantum world gradually conquered cosmology and surprised observers with further irrationalities. The estimated number of galaxies in our visible universe is close to 500 billion (Galaxies, 2013). One galaxy alone is home to over 100 billion stars. This unimaginably huge amount of matter is believed to have emerged from an exploding Big Bang event. It began as a seed, smaller than an atom. At that time space-time is said to have experienced its origin ... but that's not all. Although a determination of time, of clock time, under Big Bang conditions seems to make no sense at all, astrophysicists distinguish ten significant Big Bang