

Symphony of Matter and Mind

Part two

Theory of Energy Harmony Mechanism of Fundamental Interactions

Chapter synopsis:

1. Energy Balance.

The first chapter deals with the fundamental concepts describing the observed regularities of two-way energy interactions in this world: attraction and repulsion, merging and separation, creation and destruction. Historically they were attributed to gods responsible for these processes. In the era of science, they were initially called ‘forces,’ but this concept did not differ much from the old mystical one.

Changing the word ‘force’ for the word ‘field’ did not solve the problem. Trying to model fields as something made up of virtual particles carrying the interaction between real particles is getting us back to the gods, spirits and forces. We are in a vicious circle as all these ancient and modern models create the illusion of explanation as the physical mechanism is not disclosed. The question remains: how does it work physically?

The chapter also dwells upon one more old concept derived empirically: the law of conservation of energy. It is a phenomenological description that has not yet acquired an explanation. Trying to explain it within the prevailing corpuscular paradigm of the Standard Model of particle physics (SM) creates more magical properties of the virtual particles: they appear from nowhere and disappear into nowhere or travel back in time, defying any sense of physical causality. They even defy the fundamental balance law itself: according to the model, some particles have more energy than the particles that created them.

Spirits can do whatever they like, but the chapter leads the reader to a simple thought: this is not physics. Heavy mathematical artillery in the form of special ‘operators’ responsible for particle birth and annihilation does not save the model from the fact that it operates with ghosts. The chapter begins to take the reader out of SM’s ‘wonderland’ onto the solid ground of physical sense by explaining why fundamental energy-mass relationship and wave function equations can have both a positive and a negative solution and why the balance is working. For that, it switches to oscillatory and wave phenomena descriptions.

2. Basic Energy Pulse.

This chapter continues to look at various interaction phenomena from the proposed model point of view, explains the binary nature of basic energy fluctuations without using particle-

antiparticle duality hypothesis within SM, and thus avoids a set of contradictory conclusions of the old model.

3. Phantom Particles and Real Wave Physics.

This chapter deals with wave-particle duality, which is considered a compromise that avoids the contradictions of a corpuscular paradigm. Some think the issue has been settled. But calling something a compromise does not mean it got rid of the problems. Moreover, the name ‘wave-particle duality’ is nominal, as SM speaks exclusively about particles. Thus, it states such oxymorons: interference of an indivisible, elementary particle (electron) with itself; interference patterns are not physical wave patterns, but waves of the probability of particles being here, there, or anywhere; an indivisible particle has wavelength and frequency; particle knows the observer’s expectations, behaves in such a way as to fool the experimenter and appear either a particle or a wave.

Richard Feynman called it “the mysterious behavior in its most strange form ... which is impossible, *absolutely* impossible, to explain in any classical way, and ... contains the *only* mystery.”

Half a century has passed since this confession of one of the founding fathers of SM. Still, it has not been explained in any way if we do not consider the usual references to magical ‘quantum properties.’ The chapter shows that the mystery can be solved in a classical (physical) way without any problem. It also reveals the reason for the SM dead-end concerning this issue: it is the result of a category mistake (taking measurement discreteness for the discreteness of matter) and objectification mistake (sampling of a wave process is taken for a particle as an object)

4. The Mystery of Electricity.

This chapter takes us back to the issues that, to many people, seem to have been resolved a long time ago. It is an illusion. Even though our modern civilization rests upon the practical use of electromagnetic interaction, no model has explained it so far. There is a simple reason for it: at one of the crossroads of theoretical thought a dead-end path has been chosen, and we forgot that there was any other way. Here again, changing the wording from powers of God to lines of force or the power of the electromagnetic field does not mean that we are talking physics. Without explaining the mechanism, we are walking in a circle.

SM does it by its own standards: the mechanism becomes the mysterious interaction of particles with their emission and absorption of one another with unknown details of the process. They are waiting for disclosure, but for now, they remain the desired hidden variables. Mysteries cover quantum reality. We are told: it is impossible to explain it in a classical way, so just accept it, shut up and calculate. As for the lower level ‘elementary school’ model, it just goes in logical circles like this one: electric charges repel if they are of the same type and attract if they are of the opposite type; they have the same type if they repel and the opposite if they attract. We are told: just learn it, never ask any questions.

The chapter with childish curiosity step by step describes the riddles of the electromagnetic interaction from the school curriculum to the academic, shows that they are born within the

corpuscular model, and takes each one under the scrutiny of a new model showing how they can be resolved.

5. The Mystery of Fundamental Interactions.

This chapter proceeds from the hypothesis that all types of fundamental interactions (strong nuclear, weak nuclear, electromagnetic, gravitational) are different levels of the same mechanism of interaction proposed in the Theory of Energy Harmony and describes various phenomena from this point of view. It goes from everyday electric currents to superconductivity. It explains 'quantum entanglement' in a classical way without any quantum mysteries and keeps physical and common sense intact. It looks at gravitation as a real interaction and not some illusion created by the space-time phantom curvature. It even deals with the old mystery of the two sides of this interaction, thus changing the perspective. There is not only gravitation but repulsion and balance as with any other type of energy process.

6. Hydrodynamic Analogy.

This chapter widens the scope of the model to interactions that are not considered fundamental. It shows that the regularities of all known energy interactions are the same and can be explained by the universal mechanism. It takes us back to the old experiments in hydrodynamics that have shown complete analogy to other interactions but were put aside by the mainstream for the lack of an explanation.

The chapter returns to the initial descriptive hydrodynamic analogy used at the onset of the electrostatics and gives it a new boost by answering why manifestations of various processes are analogous. It shows why the good old classical formulas derived empirically and describing various interactions look identical but only use different symbols for parameters. Thus, it takes them from the phenomenological model level to a model with explanatory power.

7. Canceling the Void.

This chapter shows that the problems of the corpuscular model are not only due to the category and objectification mistakes but have one more, probably the main, origin. Here again, we face the dilemma: the interactions at a distance need a medium. But why does the mainstream avoid analogies of interactions in the clearly tangible environment like water with interactions that are going on in 'empty' space? The answer is in the question: they consider it empty.

Classical physics thought such interactions were mediated by an environment called ether. There were many models of ether, but they were all mechanical. These models had internal contradictions and were also refuted by experiments. Based on this, at the beginning of the 20th century, Albert Einstein declared the ether concept superfluous. He proposed the notion of a space that "cannot be characterized by any physical quantities." Thus, he created the void, nothingness (however paradoxically it may sound).

What mediators can carry interactions in the void? It can only be done by virtual particles flying through it. It started from the invention of massless photons as carriers of light and proceeded with a never-ending list of the 'particle zoo.' The ether theories were proclaimed unscientific and are still taboo within the mainstream. But for some reason, the stories of angels

carrying interactions on their wings through the void are considered scientific to this day. The chapter shows at what cross-road was the wrong turn to the dead-end taken and brings us back to another possible road where we may see the light at the end of the tunnel. There is no sense in reviving the old mechanical models of the energy environment of fundamental interactions. But there is still less sense in talking about the void with no physical quantities if we want to talk physics.

At the end of his life, Einstein wrote that “the concept of empty space loses its meaning.” From the author’s point of view, it had no meaning from the start. Einstein tried to create a unified theory of interactions calling it “field theory.” Still, he confessed that “the great stumbling block for the field theory lies in the conception of the atomic structure of matter and energy.” From the author’s point of view, it is not just a stumbling block but a dead-end.

The energy environment is certainly not a void, but it is also not a mechanical set of discrete ‘pieces.’ Energy is also not some entity separate from matter. We should not say “energy and matter.” The chapter shows the mistakes of such direction of thought and describes the way out of the impasse. It demonstrates physically plausible characteristics of the energy continuum that are in line with the empirical data we have and gives a direction for further investigation of this so far largely uncharted territory. We missed hundred years due to the taboo on the topic, but as the inventor of the void showed us, there is always a possibility for acknowledging mistakes.

8. Nuclear Fusion and Decay from a New Perspective.

Whatever scale of Matter we are studying, the question of the medium remains. Current nuclear level theories are based on the planetary model of an atom with ‘balls’ of particles flying in the void between them. To explain the observed phenomena of nuclear reactions, the model resorts to the same old trick of inventing new virtual particles with unique properties. It also cannot avoid using the notion ‘force’ for the lack of an explanation of why these ‘balls’ do not fall into one heap or do not fly away from each other but stay on their ‘native orbits.’ It simply cannot explain the old riddle of attraction, repulsion and balance.

Each type of fusion and decay is awarded its own interaction constant with unrelated values. If there is no explanation of dependencies, they are just proclaimed ‘rules of the game,’ which virtual entities obey. There are so many arbitrarily introduced ‘free parameters’ that SM is ad hoc and clumsy, to say the least. It is the same shell game when balls appear from under a shell when and where a trickster needs them. It is either a new virtual particle or a magical renormalization of the old one. But the result is that the theory does not have explanatory and predictive power. SM is just smart in the art of producing equations in which the number of virtual particles and their mysterious quantum properties are adjusted to the result of empirical studies.

Theory drags behind, and practical progress is not due to a good model but happens despite the bad model. The hierarchy of spirits (types, colors, generations, etc.) invented by SM is so complicated that people associate it with the complexity of nature. But is it really complex in its fundamental laws? It constantly demonstrates the same regularities in all kinds of energy

interactions, and its mathematics is extremely simple down to ratios of integer numbers. Only when we invent spirits in the void to explain things, do they get complicated as spirits tend to multiply into infinity.

The chapter considers deficiencies of the mainstream model of nuclear level interactions and takes a new look at the issues that have become riddles. It offers solutions from the new model point of view without any unnecessary complication and multiplication of entities. It looks at the results of old experiments and at some recent ones that just couldn't happen within predictions of SM but are elegantly explained by Theory of Energy Harmony.

9. In Search for a Unified Theory of Fundamental Interactions.

This search has been going on for a long time. All prominent theoretical physicists tried to work out some kind of an integrated model. There are many examples, but if we take just one, we can see the problem. Grand Unified Theory tries to combine electromagnetic, weak and strong forces in one model. How does it do it? Nothing new: it invents a new force. It has never been observed, but the model says it just has to exist to unify other forces. The model tries to convert theoretical physics from its current state of polytheism to monotheism and postulates a new single god. The trick is an old one: if you do not have an explanation of a physical mechanism, just say it's the mysterious ways of a virtual entity.

Why does the unification of different interactions does not happen within our modeling process? Is it because physical regularities are various? No, they are fundamentally universal. The reason is in our heads, in the model of the reality that we construct. Richard Feynman made that confession a long time ago: "Today our theories of physics, the laws of physics, are a multitude of different parts and pieces that do not fit together very well. We do not have one structure from which all is deduced." Half a century later, we are still in the same position: no general coherent picture, only scattered fragments. This is the pathology of modeling reality.

The splitting is so strong that it has become strict segregation. The chapter shows how discoveries and adequate physical modeling explaining the observed energy interactions in one area of study do not reflect on the others that have put blinkers of SM on their eyes. It takes a wide range of areas and a broad historical view on the ideas and experiments that lead us to the conclusion that seems obvious in hindsight: analogy makes sense. If the same equations can describe the systems, this means that they are physically similar. And vice versa: if systems have the same underlying physical mechanism, they can be described with the same words and symbols. The details may vary as we may be looking at different levels of the same process, but the essence remains the same. We have to get back to Maxwell's simple thought: "In order to obtain physical ideas we must make ourselves familiar with the existence of physical analogies. By a physical analogy I mean that partial similarity between the laws of one science and those of another which makes each of them illustrate the other."

10. Sunset of the Mechanical Model and Wave Model Dawn.

This chapter continues the list of analogies from a wide area of studies and gives an explanation within the Theory of Energy Harmony, thus showing that it unifies not only fundamental interactions but is a model for all known energy interactions. It claims to combine

all similar phenomena into a coherent and consistent model by looking at them as manifestations of energy processes in a continuous oscillatory energy environment with various levels where parameter details differ, but regularities ('laws') are the same and can be described by the same mathematical tools. But these tools do not have anything to do with the corpuscular model of the world. They describe continuous dynamical oscillatory and wave processes.

We need to overcome the deficiencies of mechanical models (be it classical or quantum mechanics) that lead to the creation of non-physical entities to cover the explanatory gaps. This mechanistic picture of some basic 'bricks' of the Universe has to go to the history of science bookshelves. Any model is useful, even a wrong one, as we can learn from its mistakes. We have done a lot of analyzing and breaking things into simpler parts, but the time has come for integrating. Theory of Energy Harmony tries to harmonize our model of the world by showing the regularities of the harmonies and rhythms of the music of Matter. Its self-consistency is based not on patching holes by virtual entities, unexplained 'fundamental' constants, absolutes or forces but on the universal character of the physical mechanism it considers.

11. Birth of a New Science.

This chapter is devoted to the previous studies of the proposed mechanism, thus showing that the new theory is not a 'heaven sent' revelation but has a long history and is grounded on empirical research, theoretical modeling, intuitive and mathematical descriptions made by generations of scientists. It just takes their ideas a little further, thus overcoming the pathological state of disintegration and segregation of various fields of study.

12. Harmonization of Chaos.

This chapter continues to describe the mechanism and explains why it is the answer to the ancient ontological question: how does order appear from chaos? The old answer was the creationist idea of a super entity responsible for everything in this world. The new approach takes another perspective that avoids this ancient mistake of objectification. It states that the creator of structures is not an entity transcendental to Matter but is a process imminent to Matter.

But it is not enough to state that it is a self-organizing and self-sustained process that does not need any ubiquitous supervisor. Saying that something is not created but is emergent, self-created does not provide an explanation. Only showing the mechanism, answering how it physically works takes us out of the magical childish way of thinking into the physical modeling that will have adequate explanatory and predictive power. After all, this is the task of any model. We can harmonize our understanding of this world, which has general laws of energy transformation and interaction of forms of matter. Harmonization of the chaos of our views on reality will lead to harmonious interaction with this reality.

The chapter also contains bridges to the following volumes that will take us from non-living to living Matter, starting from the general levels of description and going down to the finest physical, physiological and technological details on how living systems form, function, develop and adapt to the world in which they exist.