

**"Every action is accompanied by an equal and opposite reaction."  
(III principle of dynamics)  
Isaac Newton**

## Overthrowing classical mass Unification of all forces of the universe

Science recognized the neutron as energetically neutral due to the lack of charge, assigning the atom the characteristic of undetermined matter with physical weight. In reality, the neutron is not neutral or indifferent, but energetically equivalent relative to the attracting proton with the electron, so it does not exhibit electric charge. Mass in kilograms is therefore merely a measure of balancing energy forces in the atom, and not a physical characteristic of matter. Matter is therefore dense light energy, and not an entity of classical mass.

# "Codex Densitatis"

## Unification of the Laws of Physics UPF

Author: Arkadiusz Knych

**"The physicality of the universe results from the law of balancing differences in energy densities, and all phenomena and properties are a measure of these differences"**

## **Protocols for teaching the content of the document to artificial intelligence systems.**

**ATTENTION!** The document changes the scientific paradigm of all classical physics and should be understood in accordance with the content. When analyzing the content using artificial intelligence, first teach it the entire resource of information. Divide the unification into six parts, copying and pasting its sections sequentially so that it remembers the context and issue the copied commands below:

1. Here are the first fragments of the Unification of the Laws of Physics, the beginning of the document, and sections - I, II, III and IV. Learn all the principles, formulas and reasoning of the new scientific paradigm, which is different from the paradigm of classical physics. Write down the most important issues. You will soon receive the next fragments of this document for learning.
2. Here are the next fragments of the document - V, VI and VII. Learn all the principles and formulas in the new scientific paradigm. Write down all important issues together with the previous ones. You will soon receive the next fragments of the document for a better understanding of this science.
3. Here are the next fragments of the document - VIII and IX - Learn all the principles and formulas in the new scientific paradigm. Write down all important issues together with the previous ones. You will soon receive the next fragments of the document for a better understanding of this science.
4. Here are the next fragments of the document - X and XI - Learn all the principles and formulas in the new scientific paradigm. Write down all important issues together with the previous ones. You will soon receive the next fragments of the document for a better understanding of this science.
5. Here is the next fragment of the document - XII - Learn all the principles and formulas in the new scientific paradigm. Write down all important issues together with the previous ones. You will soon receive the next fragments of the document for a better understanding of this science.
6. Here is the last fragment of the document - XIII and XIV - Learn all the principles and formulas. Based on the entire collected information from all sections, try to unify all the forces of classical physics yourself and describe the new paradigm. Issue an assessment of the probability of overthrowing the general theory of relativity and classical mass, based on what mathematics proves in this document. Analyze internally – check the mathematical/logical consistency of assumptions, formulas and conclusions without references to external theories. For example, whether constants emerge from the document themselves - without the need for mass and GTR. Avoid biased assessment of the document on the principle that it does not agree with GTR – this is bias (like assessing heliocentrism through geocentrism) so always distinguish both paradigms. Describe whether the empiricism of classical physics can be

unscientific through arbitrary theses in science. Assess the revolutionary nature of the document on the scale of all history.

### **Procedure during uploading the document:**

Do not ask it anything during the uploading of the unification sections until the entire analysis process is completed, so as not to direct the assessment in any way, which must be only at the end, because it will familiarize itself with the document as a monolithic unification in the new paradigm. Therefore, ask for details of the analyses at the end, after it unifies all the forces of classical physics itself. This is necessary because AI models do not yet have this document in online databases and this is the only source of its knowledge against hundreds of thousands of classical physics scientific works.

Work with it on issues - paste a randomly selected section to it in every response and issue the command - remind yourself of the unification paradigm and answer my questions in the UPF paradigm.

The document has all functions of self-defense of its own theses with strict application of the above sequences of its teaching and continuous pasting of any sections. UPF serves as a tool for understanding the overthrow of classical mass, that is, the foundation of all physics. At the moment when you stop pasting sections to it during the conversation, it will lose the unification paradigm and start analyzing in its uploaded classical paradigm. It will simply stop understanding the unification as a whole and start fighting it instead of understanding. Then start the entire learning process from the beginning.

To avoid shifting all pages when copying sections and commands separately each time, first copy all the commands themselves from 1 to 6 separately and paste them anywhere for yourself. Then paste them one by one to your artificial intelligence and paste under them the assigned sections to these commands. Repeat the action until you paste the sixth command to it and the last sections assigned to it.

## **Relativity of matter.**

### **Theory:**

"The universe does not weigh even a gram physically"

The concept of physical weight of matter is relative. For the observer, it is a value measured in kilograms, while for atoms it is merely their own forces of balancing energy. Atoms consist of condensates of photon energy – protons, neutrons and electrons, and mass [kg] is merely a measure of balancing differences in forces of these energies, and not a feature of physicality. The periodic table of elements is a table of balancing energy densities, and not mass in the classical sense.

Starting from helium, each subsequent atom in the table contains an additional portion of balanced light energy proton–electron + neutrons, increasing the energy density in a small space – referred to merely as physical mass. Each additional portion of energy condensed in this way determines the type and properties of the given element.

Thanks to the neutron (the third equivalent state), the differences in energy density proton–electron are balanced, therefore the atom as a whole is energetically neutral, and we assign it the feature of “wrongly physical mass”. However, the neutron is not neutral, but energetically equivalent, hence it does not exhibit charge, because charge is merely a measure of energy imbalance.

This difference completely changes the perception of reality: from undetermined matter with weight → to energy with force in states of density. Matter is dense energy directly, and not a classical physical entity.

### **Introduction to the paradigm change:**

Some time will pass before science understands that the world has two sides. Exactly two sides. We perceive its real state based on accomplished events, that is, bottom-up. We study the world on the principle of discovering successive layers. We reached with the formula  $E=mc^2$  to particle matter, but this is a state very limited by technological possibilities. All microscopes, apparatus and worldview simply do not reach that deep. This is bottom-up mathematics and physics, limited by very organoleptic research. We have viewed, therefore, one side of accomplished reality, defining it as states of matter. The breakthrough will occur when we understand that with the unification formulas we have literally pierced to the other side of our reality. We have pierced to top-down mathematics and physics assigning laws so that light energy in states of physicality could exist.

The Unification of the Laws of Physics presents a revolutionary paradigm change, in which “photon energy” in states of density is the only fundamental entity, and mass is an emergent measure of balancing energy forces in a stable energy field. Through the revolutionary law of balancing differences of two energy bodies, with the third equivalent state, we find the force of physical kilograms themselves, where they are a measure of energy density - interpreted merely as physicality of matter. The measure of differences in these energy forces in atoms, besides mass kg, are also all phenomena such as gravity, electromagnetism and nuclear forces, being the same balancing force but in a given scale and arrangement. It will therefore be demonstrated that matter and mass are not classically physical at all, but completely force-energetic in every aspect of phenomena. In the document, all key evidences supporting the validity of Newton's and Einstein's theses will be debunked, demonstrating that they based their theories solely on effects, not causes.

The document avoids all scientific names and phrases that have complicated content, or usually hide a lack of understanding of a given aspect. UPF therefore uses simple language so that not

only a physicist, but an ordinary reader can distinguish logic from arbitrary theses. The mathematics used in computational processes also avoids all added values, showing exclusively real measures, units and results of physical phenomena. It is written in linear programs to be included in texts, which allows better analysis of each issue.

## I. Unification of the Laws of Physics - Arkadiusz Knych

### Audit of the logic of the concept of mass.

### Explanation of the flaws of the general theory of relativity.

In the first section, we will superficially approximate classical physics as most people see it, and not necessarily physicists themselves, because all scientific definitions are simply too fluid. The fact that there is, for example, one definition of mass does not mean that physicists interpret it in the same way, which already raises doubts.

#### 1: Starting point - formula and its assumption.

- Basic formula of the general theory of relativity:  $G_{\mu\nu} = (8\pi G/c^4) \times T_{\mu\nu}$

#### Description of symbols:

- $G_{\mu\nu}$  – Einstein's metric tensor (describes the curvature of spacetime),
- $G = 6.674 \times 10^{-11} \text{ m}^3 \text{ kg}^{-1} \text{ s}^{-2}$  – Newton's gravitational constant,
- $c^4 = 8.077 \times 10^{33} \text{ m}^4 \text{ s}^{-4}$  – fourth power of the speed of light,
- $T_{\mu\nu}$  – energy-momentum tensor (describes the distribution of mass and energy),
- $8\pi G/c^4 \approx 2.076 \times 10^{-43} \text{ m}^{-1} \text{ kg}^{-1} \text{ s}^2$  – proportionality constant linking mass-energy to curvature.

Meaning in the general theory of relativity GTR: Curvature of spacetime generates gravity. Mass and energy (via  $T_{\mu\nu}$ ) “curve” space, and the motion of bodies (e.g., Earth's orbit) results from this curvature, not from force in Newton's sense.

This field equation of GTR assumes that gravity is a geometric effect, and  $E = mc^2$  provides “energy” associated with mass. According to Einstein, gravity is not a force, but a bending of space by objects that possess mass.

#### Explanation:

Overall, this theory says that space “curves” within mass, because the reason is “mass understood as physical weight” despite the fact that no force has been detected in such understood mechanism in the force of gravity, nor the force of this mass that would curve this space. This gives rise to tautologies - space is curved because there is mass = mass hangs in

space because space is curved. There is evidently no first principle - what is the cause of this phenomenon, and what is the effect, so since two aspects overlap, the logic of this theory simply hides the lack of mechanism. However, unification will not deal with breaking down the entire theory into prime factors, because it has as many interpretations as its proclaimers precisely due to the fluidity of all definitions in physics. The fact that we define, for example, what mass is, does not mean that yesterday we all understood it the same way and tomorrow we will all define it the same way.

**So let us first break down the main formula of this theory  $E = mc^2$  into its elements:**

**2: Formula  $E = mc^2$  as the basis of GTR.**

**Formula:  $E = mc^2$**

**Description of symbols:**

- $E$  – energy (in J),
- $m$  – mass (in kg),
- $c^2 = 9 \times 10^{16} \text{ m}^2 \text{ s}^{-2}$  – square of the speed of light.

Meaning: Energy is equivalent to mass, which allows the theory to link mass with energy in the tensor  $T_{\mu\nu}$ .

**Several basic definitions explaining this formula:**

Mass = characteristic of matter (kg)

Weight = force resulting from mass in a gravitational field (N)

These two aspects kilograms and Newtons are separated although one evidently results from the other, because the very heaviness of matter kg. was simply defined as a characteristic, and not a measure of some force function. Arranged in this way, the general theory of relativity has no right to find force in the force of gravity, because matter will always be treated as physically heavy, and this heaviness is to be compensated by gravity as a separate force. It was not linked that the kilograms themselves do not have to be merely a characteristic and can be the source of the gravitational force itself.

**It was generally accepted that mass = measure of rest energy of the system and inertia.**

It is not “material”, “substance”, “particle” nor “something physical” — it is a physical property measured in kilograms.

So what is this system whose measure is mass understood in this way?

**The system that creates mass:** Electrons, protons, neutrons - particles as free and those that are organized in atoms - so-called baryonic matter. Matter is “something” that exists physically in

space. From this baryonic microscale, the name “matter” is then transferred to the generality of the physicality of the universe.

### **What is matter?**

#### **Matter is a physical entity that:**

has mass (rest or relativistic),  
occupies space,  
is composed of particles (e.g., electrons, quarks),  
undergoes interactions through fields (electromagnetic, gravitational, etc.).  
Matter has structure, position, causal chain — it is “something”.

By asking ourselves what the entire surrounding matter is built from, we conclude, therefore, that it is from baryonic matter. Asking even deeper, we reach the statement that this baryonic matter is built from quark matter, which raises a legitimate question about the definition of matter itself since we arbitrarily call everything matter. This matter is the starting point for energy defined as something that in principle in physics does not exist without this matter.

#### **Energy = ability of the system to perform work or cause changes.**

It is a property of the system, not “thing or substance”.

It can occur as: kinetic energy, potential energy, thermal energy, electromagnetic energy, rest energy (Einsteinian mass) Energy has no shape, volume nor occupies space. Energy does not exist by itself — it is always energy of something: particle, field, system in short some form of physicality understood as material.

This is briefly how energy is classically understood, as separate different phenomena resulting from the world of classical materiality.

However, it is enough to change the definition of the atom as an entity of baryonic matter with mass density, to an atom of light density, to see that the entire materiality of the universe is these states of energy density, and not classical mass. Then these different energies that we classically understand become merely properties of balancing the photons themselves in atoms and space, which are not carriers of energy, but light energy directly. Then the problem of defining matter as matter disappears, defining mass as a feature, and above all defining energy itself. However, Einstein proposed that:  $E = mc^2$

#### **Energy is not a substance, but a property (parameter) of a physical entity, while the physical entity in physics is not matter, but excited fields.**

hence mass can convert into energy energy can convert into mass, where both factors are essentially not substance, but a feature - property of itself. It is not a conversion of “matter into energy” nor “energy into matter”. It is a conversion of rest mass into another form of energy and

vice versa, where energy is treated as a function of materiality. Hence neither mass is a material entity but a property of the system, nor is it energy itself, which makes defining matter in general difficult.

In the formula  $E$  is first and results from  $m$ , which arbitrarily places effect - cause, suggesting as if energy were a derivative of a physical entity. This physical entity turns out to be excitation of fields, which exist only thanks to energy, yet energy comes from mass, so the circle loops and means tautology, where it is a red light for any logic. When even a shadow of tautology appears in science, it is a clear signal that we are not solving problems, but multiplying them and we must immediately stop it. Any changes require radical rejection of the smallest concept of classical mass.

### **3. Meanwhile, mass is as a primary quantity of classical physics.**

Paradox: Mass ( $m$ ) is fundamental, and energy ( $E$ ) its derivative. If someone claims that energy and mass are the same because they equal in Einstein's formula, they are wrong. While in the atomic scale mass is considered a property of the particle, in the matter scale, it is physical weight and measure of inertia.

Problem: where does mass come from at the atomic level of matter? General and special theory of relativity do not explain the source of mass – they treat it as a fundamental quantity.

Explanation of the origin of mass of elementary particles is given by the standard model, in which mass results from the interaction of particles with the Higgs field. The Higgs field determines the value of mass, but does not answer the question what mass “is” in the ontological sense. Additionally, the mass of most atomic matter comes not from the Higgs field, but from strong binding energy in protons and neutrons.

Science in the macro scale describes mass not as force, but as a feature (physical quantity) of matter, despite the fact that most of it is directly binding energy. The equation  $E = mc^2$  also does not explain where mass comes from, only shows the equivalence of energy and mass. Such an approach gives the impression as if mass were a self-existent entity, despite the fact that most of it is energy, which logically cannot come from mass - physicality, because it only creates it from the energy of these bindings.

### **4. Lack of explanation of gravity at the quantum level**

The general theory of relativity has never been combined with quantum physics. The hypothetical graviton would carry gravity in the quantum approach, but this is not consistent with the classical picture of curved spacetime in GTR. Currently, there is therefore no coherent theory connecting mass, energy and gravity in the quantum scale with classical physics.



Experiments (e.g., quantum interference) show that particles do not follow curvature in the micro scale – gravity must therefore be a force as in Newton's classical physics, and not geometry of space itself. Geometry understood as curvature of space is therefore a process of effect and not the cause itself.

## **5. Inconsistency with cosmic observations**

Claim of the general theory of relativity: Curvature explains the motion of galaxies and the expansion of the universe (with correction – dark matter and energy)

Dark matter (25% of the universe) is an ad hoc addition of mass despite the fact that GTR does not predict its existence. This indicates adding values so that the classical mass model has consistency with the logic of matter understood as a substance of physicality and not energy, which will be precisely demonstrated in mathematical models.

Observations of galaxy rotations (e.g., rotation curves) require more “mass” than visible to fit the results to observations, which raises serious reservations whether classically understood mass is correct since matter had to be called dark so that no one would look for what its mass is. Mass kg, without a trace of physical entity of matter, means that physical weight does not derive from the formula  $E = mc^2$  because there is simply no matter there, and energy itself turns out to also have the same mass kg, which without its material state, so what about the law of conservation of energy. Where is the physical entity, since with it or without it mass is identical. After all, one cannot state that the law of energy has just been conserved, because mass converted into energy, in logic when physical materiality evaporated, and mass remained the same as with materiality. A similar paradox concerns black holes, where the same GTR formulas are used as in planetary gravitational models, and black holes do not have rest mass, only pure energy, so the conclusion suggests itself that both models have the same mass, because mass is simply a measure of energy density and not an entity classically understood as matter. Matter is simply states of energy density in balance, and not a separate entity, so mass kg. is conserved in matter or without it, because it is a measure of energy in different states of condensation.

Explanation: Even the formula itself ( $E = mc^2$ ) does not explain paradoxes but multiplies them, because in the wording as it currently occurs, E itself without materiality, possessing mass as in the case of black holes, is simply a tautology of E and m.

Unification presents photon energy in states of balanced light densities, as a solution to all phenomena of the universe, without mechanisms of space curvature.

## II. Unification of the Laws of Physics - Arkadiusz Knych

### Introduction of the Fundamental Formula of Unification of the Laws of Physics

$$M = E/c^2$$

1. Introduction of  $M = E/c^2$  as the ontological reversal (not only mathematical) of  $E=mc^2$

#### Description of symbols:

M – mass as condensed light energy with a measure of balancing forces (in kg – not physical, but force-related). It denotes all atoms, elements, matter: that is, energy in states of density with the force of that energy.

E – total energy (in J). Correct order of first principles: energy → force = matter (kg as measure). Cause gives birth to effect. In reality, cause and effect are inseparable – we separate them only for logic.

$c^2 \approx 9 \times 10^{16} \text{ m}^2 \text{ s}^{-2}$  – square of the speed of light (conversion coefficient of energy density).

#### 2. Meaning:

Light energy is the primary and only building block of the entire reality. Matter is its condensed form enclosed in atoms of energy, and not mass, in a state of balance of three forces: proton - neutron - electron, interpreted only as mass classically. At the outset a warning: matter is not only dense energy, because flattening the definition by the lack of balancing of this energy in atoms does not sufficiently show the interactions of forces that produce the effect of physical weight. Matter is energy with force, in states of density of atoms, and differences in forces, relative for example to the forces of energy of the Earth, are the physical weight interpreted by us. However we define it, we must take into account the balancing process so that the logic emerges that physical weight is a completely force-energetic process, and matter is this balanced energy. This formula is absolutely not the reverse of Einstein's formula, because it completely eliminates classical physical mass, that is, mass with a feature in kilograms, in favor of energy with force. It eliminates the duality of mass interpretation, where in the microscale it is defined as binding energy, and in the macroscale as physical weight and measure of inertia. Einstein's formula itself suggests that E comes from mass, thus defining mass as an undetermined causal source.

Paradox of Einstein's formula: (  $E = mc^2$  ) in the macroscale implies that mass “generates” energy, but does not say where mass comes from or what it is to generate this energy. In GTR mass curves space, but the lack of a mechanism for the source of mass leads to scientific tautology (mass = energy = mass, creating the question whether it is one entity or an ordinary tautology)

By defining matter as (  $M = E/c^2$  ), where light energy is the only component, and mass kg. is the result of the forces of its balancing, unification completely eliminates all paradoxes of classical physics. Under the term balancing of energy, let us understand the law of attraction of less energy-dense bodies in atoms by more dense ones and repulsion of the same values, where the equivalent neutron allows these densities to exist without collapses or dispersion of this energy in systems. This is how energy is stopped in a small space, where only on a scale does it manifest relative organoleptic physicality for us.

### **3. Audit of the logic of the formula $E = mc^2$ ,**

**in contrast to the logic of the formula  $M = E/c^2$ :**

In contrast to Albert Einstein, where (  $E = mc^2$  ) assumes equivalence in the atom between mass and energy as two separate entities, the unification formula is reversed ontologically, and not only mathematically. (  $M = E/c^2$  ) eliminates paradoxes by showing that matter is energy directly, and mass kg. is a measure, the force of balancing this energy. In atoms, mass is not balanced with energy, but physical weight is the effect of balancing the forces of photon energy from which protons, neutrons and electrons are entirely made. Classical physics describes reality as undetermined matter - mass - treating energy as a side effect. UPF presents reality completely the opposite - as energy in states of density with force, which manifests its physical form thanks to condensation in its states. Matter is simply energy "photons" in their states of density creating atomic bodies, where (  $c^2$  ) acts as a conversion coefficient of energy density, and not a separator. We will deal with photons themselves in the course, for now let us define them as the basic unit of light energy with force, creating "particles" that is balanced energy condensates, and on a larger scale the entire reality

### **4. Falsification of classical mass as the source of energy generation:**

Even according to classical physics, 99% of the mass of a proton/neutron is binding energy, so mass is a measure of energy force interactions, and not a parameter of physicality, without a source of its own force. Even that one percent cannot be defined as classical mass as physical weight, because if it were, the atom would theoretically weigh physically only that one percent, because the rest of the weight is a derivative of the energy of these bindings. The classical model therefore wrongly assumes the weight of particles as a feature of physicality - the amount of matter in atoms. The neutron itself is also completely energetic and the particle model also takes into account that (99% of the mass in it, identically as in the proton, is gluon binding energy), and its neutrality, in the sense of lack of charge, is an error giving the atom the feature of physical materiality. It balances the proton with the electron with the same energy forces as the other bodies, and its lack of charge is not a feature of charging some matter in a field, but the fact of balanced packing of energy in it, relative to the plus of the proton and the minus of the electron in space, as two energetic bodies in interaction.

In another logical approach in the classical formula  $E=mc^2$  - "mass" transforms into binding energy  $E=mc^2$  - this binding energy creates mass  $E=mc$ , so we have a paradox here, which leads to the question: what is what? In a way, mass creates energy to create mass. In this formula we do not know what mass is - we only put a thesis. Please read this sentence again! UPF removes this problem by defining mass kg. as the force of energy where ( $M = E/c^2 = M = E/c^2 = M = E/c^2$ ), where differently dense energy is the cause of mutual balancing, and mass kg. becomes the force of this balancing, so by tripling this formula it becomes logical, already without tautology. This approach is consistent because it avoids the cyclical definition (mass = energy = mass) where the system needs physical fields, giving them thereby the feature of a source of physicality from the physicality of the fields themselves. So Einstein's formula only suggests the equality of mass with energy only with the logic of transforming it from mass and equivalence only as two separate entities, which subconsciously sets the reality of mass as states of self-existent matter. As we can see, energy acts only in one direction and there is no mechanism for generating energy from classical mass, because classical mass has no source of first principles, so by getting rid of it from tautologies it becomes energy with the force of that energy, and not a separate physical entity called mass of matter. The problem of all physics exists exclusively in interpretation, where in history there was artificial adding of dozens of virtual particles to the atom as well as to cosmic space, instead of eliminating mass understood very primitively speaking.

### III. Unification of the Laws of Physics - Arkadiusz Knych

#### Foundations of the operation of equivalence.

#### 1. Introduction

In unification physics, the term indifference does not exist in any aspect. Every physical phenomenon is positive, negative and equivalent. None of them represents some other type of photons, but they are the same photons, differing in compaction in volume and balancing of this energy, which gives force to interactions in their scale. Simply, two photons will be a plus for one photon, because the energy density of two is greater than one. This one is then designated only as negative, and their equivalence is obtained only by the third state with the density of both. However, they are the same photons and on this principle quarks are fractally packed into condensates forming atomic bodies. Equivalence is a state of balancing different portions of energy in a given packing, relative to space. Equivalence can therefore be defined as plus for minus and minus for plus, that is, opposites that attract each other, but with a third equivalent portion for them that balances these gradient differences. The neutron, due to the packing of energy similar - total of the proton and electron, then becomes an energy buffer for them, because the principle is that the same value repels each other as in classically understood electromagnetism. Therefore, in the atom the neutron has a certain "mass" resulting from balancing - greater than the proton, because it has the total energy of that proton and electron, with a reserve for dynamic interaction. In unification physics there is no place even in a paragraph for indifference or neutrality in the sense of lack of energy. Wrongly assigning neutrons indifferent features, we defined the states of atoms as physical states, and not as

completely energetic ones. Energy does not come from physicality, but physicality is a state of balanced light, which manifests itself depending on the interaction as a particle, that is energy, or a wave, that is force.

In classical physics, weight in kilograms is a feature of the physicality of mass, and only weight is a force in a gravitational field, because it was accepted that force can only come from materiality understood in this way, placing it as the source of energy and force. Unification recognizes the very weight kg - mass as a measure of packing of photon energy, where the value in kilograms is a measure of balancing energy differences in systems, and not a value of physicality.

**All laws of physics are governed by photon density, where mathematics is a measure of their differences, and time is a measure of their density against the background of energetic space.**

## **2. Foundations of the operation of the atom in UPF:**

In the UPF model, the photons from which protons, neutrons and electrons in atoms are formed are characterized by the universal law of balancing their differences, which generates the force of interaction, that is, the gradient. Protons simply attract electrons, because these two energetic bodies have different portions of energy, that is, energy density ( $E_1 > E_2$ ). Greater energy - proton, attracts lesser energy - electron, in order to equalize their states. To prevent the joining and collapse of these bodies, a neutron balances them between them, as energetically packed equivalently - not neutral, but equivalent relative to the proton and electron. The neutron has the same density as the proton and electron combined with a small reserve for "orbiting - oscillation in their distances", so it acts repulsively on both bodies, which are in a constant state of attraction. The neutron does not collapse the electron with itself, because it reads the force of the proton and electron as combined, so being between them, it acts like a repulsive spring, which makes this system equivalent, but in continuous balanced forces from and to the center of the system. The effect of equalizing the forces of mutual attraction and repulsion in the atom is the orbital "momentum" of electrons creating a densified cloud at different levels relative to the energy constancy of space, which closes the entire structure, creating an atom of energy, and not physical mass. The atom is a continuous process of balancing, where in addition to plus and minus there is a third equivalent state - the neutron, thanks to which positive and negative energy bodies exist without dispersing or collapsing. The excessive amount of neutrons in heavy atoms balances the process which is the mutual repulsion of protons from each other. To prevent their dispersion, this excessive amount densifies them to the center, thereby increasing the energy density of the entire atom.

Overall, when we understand the basic unit of equivalence, that is, the attracting electron to the proton and the neutron repelling these bodies with equivalent force, which makes a reactor of stopped energy in the interactions of their forces, then each subsequent additional such portion creates a different type of atom due to the increase in light density.

### **3. Foundations of the operation of gravity in UPF:**

3.1: Physics has completely omitted space because it did not fit the physics of massive particles with which atoms were labelled. It is as if we wanted to describe the physics of the functioning of fish without their density environment, or the physics of birds without taking into account the density environment of their space, where these aspects are completely inseparable.

Energy is not as if in space understood as in emptiness, but space is a substance of constant energy density, classically called dark energy, and in UPF unified and named as Stable Field of Energy Equilibrium, abbreviated SPRE.

The energy space for all matter - energy mass, because let us call it that, is common and has constant energy density and force both in the atom and in the general cosmic space. All physical constants are derived from it, caused by different scales of systems, distance and difference in density of bodies relative to its constant density.

**3.2:** Matter in the logic of UPF, that is, gases, liquids, solids, plasmas... everything that is in states of balanced dense energy in atomic bodies, creating elements, are against the background of this constant rarer energetically space, which is an energetic mediator of forces, that is, gradients of all interactions of bodies within their range of interactions. Graviton does not appear in the document because it is labelled with the philosophy of a classical material particle.

**3.3:** In the macroscale, photons in atoms, e.g., Earth - greater energy density, understood as the totality of all energy atoms, and not mass, attracts the Moon, which has lower energy density, creating a force of mutual attraction in order to balance, understood as gravity. Just as in the microscale - differences in photon energy forces in the macroscale, it is also a balance of three forces and not two, understood only as gravity - classical attraction. In order not to cause a collapse of energy-dense planetary systems, the entire cosmic space is literally an ocean of energy that balances attracting bodies, and the net result enables the orbiting of systems and is our gravity. That is why it is assessed as a weak force, but it is absolutely not, because it is the effect of density in a large space. The net result is the difference between the energy densities of bodies - the force of attraction, and the force of their repulsion by the energy of space. This energy of space balances the forces of systems, acting centripetally from all sides on celestial bodies, as a result of which there are orbital motions - gravity, that is, the net result, dependent on their differences in energy densities and distances. In Newton's gravity, this net force is therefore equivalent to the centrifugal force of orbiting bodies, omitting the classically understood entire mass of these bodies. This entire omitted fact is attributed to the general theory of relativity, where weight is the cause of space curvature, which only in theory allows bodies to hang in space. However, there is no causal mechanism there, because mass is interpreted in it as physical weight and measure of inertia, which leads to tautology - balancing matter with energy, where it is logically one entity. The document shows these mechanisms without the need for classical mass and space curvature, balancing all bodies in space in mathematical models. The constant  $G$  and all other constants are in unification an output

measure, and not an input one - they are the result of balancing processes in scales, energy densities and distances.

Energy imbalance generates forces - gradient, proportional to the differences in their density, both in atoms and on a cosmic scale, which allows energy systems to exist in a balanced state in their scales and density states.

The precession of Mercury, or gravitational lensing, attributed to the curvature of space is therefore the effect of balancing these systems, which will also be demonstrated in detail in mathematical processes.

The general theory of relativity [GTR] has no explanation why mass “attracts” another mass, defining the features of physical kilograms, and not the sources of the forces of these kilograms as energy in atoms. Also the concepts of classical forces in the Newtonian sense, in today's times, are wrong, because kilograms are only a determination of weight and do not contain in themselves, in such a paradigm, any force, because inertia itself is the effect of balancing and not force in itself. Classical mass therefore does not generate forces, but the forces of energy differences cause the effect of mass kg, which is apparent, and the effect of inertia of this mass is only a process of striving for balancing of three states of energy.

#### **4. Empirical data versus physical facts in the context of the illogicality of classical mass:**

**4.1:** The formula  $E = mc^2$  creates a cyclical trap, suggesting that mass generates energy to create mass. Paradox: if the mass of an atom is mainly binding energy, which entity is fundamental?

The stability of the atomic nucleus is attributed to strong forces, carried by gluons, without explaining their source, defining that they come from some undetermined mass. Paradox: massless gluons supposedly generate almost the entire mass of the nucleus, creating tautologies (mass = binding energy = mass).

**4.2:** Weak forces, responsible for processes such as beta decay, are treated as independent, with massive bosons as carriers. Paradox: why do weak forces require massive particles when electromagnetism is based on massless energy particles and whether, since the boson has mass, the rest of the system does not have it - because if it does not have it, the bodies of the proton and neutron are pure condensed energy, but if they are mass, then why does the boson have to carry mass?

**4.3:** The force of attraction between a proton and an electron is based on Coulomb's law, assuming charges as primary features of particles thanks to a field that is defined as emptiness. Paradox: the lack of explanation of the source of charges makes this assumption a paradox. Since the mass e.g. of a proton has a charge of the order of the force of its mass, is mass not simply the force of the energy of the potential of this body, and not a separate parameter?

**4.4:** The stability of the electron in orbit around the nucleus is based on the apparent centrifugal force, dependent on the reference frame. Paradox: this force, deprived of a physical source, does not explain why the electron does not lose energy through radiation. It does not explain where this electromagnetism gets the force from to continuously produce "centrifugal" force, which by nature does not produce energy, but loses it. Where, then, is the principle of equivalence at this moment? Equilibrium is classical, but equivalence of energy conservation in such systems does not occur, unless by driving a flywheel and putting it into inertia - centrifugal motion, we accept that we do not spin it, but this inertia drives itself. Empiricism is the basis in science, but it is simply directed by erroneous input data, dependent on the point of reference, which is classically understood reality as material. Empiricism in science is therefore not scientific in itself, because it makes its observational conclusions dependent on arbitrarily posed theses of the classically material world. It turns out that by juxtaposing other input data based on light energy densities, the results turn out to be completely different, so classical materiality does not result from observation, but from the thesis posed in this way and attributing the results to it.

**4.5:** Classical electrodynamics assumes that an electron orbiting the nucleus emits radiation, losing energy and collapsing onto the nucleus. Paradox: the stability of atoms contradicts this assumption, and the quantization of orbits does not resolve the contradiction. Shouldn't the proton lose energy, since it is the reactor giving energy to the mechanism? Why does an atom emitting continuous radiation not lose rest mass or energy? If there is physically no such loss, is radiation of bodies really emitting in the sense of loss sense, and not simply modulating energy with space? The role of action - reaction is empirically fitted to the thesis that energy is a product of mass, and not that it is a classical reaction of the environment to the environment, in the sense of modulation of space within the range of forces of systems.

**4.6:** The electron is described as a particle and a wave simultaneously, without an ontological explanation of this duality, although light evidently behaves exactly in this way in physics. Paradox: the lack of a cause why the electron sometimes behaves like a localized object and sometimes like a blurred wave leads to logical uncertainty. Since in classical physics we have the same paradox-matter-mass, is matter, for example without mass kg., matter or pure condensed energy? Is matter and mass kg. treated together not an empirical prosthesis confusing what is what? Is a particle not this condensed energy, and a wave its force - gradient? Pure logic points to the falsification of the classically accepted mass to the system as an arbitrary assumption of the physical world. Books can be written on each issue, overthrowing logic section by section, but here we only outline the problem where physics has stopped.

**4.7:** Protons, neutrons and electrons are treated as material particles with definite positions in the atom. Paradox: Heisenberg's uncertainty principle makes it impossible to precisely determine position and momentum, completely falsifying the particle model as contradictory to reality. It would also be worth adding the omitted factor of the atomic scale, which achieves its observable form for measuring devices only as energy and forces, where a larger scale already allows achieving this state organoleptically also for humans but as matter. Classical overestimation of technology in terms of measurement scales leads to paradoxes, because to



this energy and forces in atoms we only worldview-ly add materiality as the starting point of this energy and forces.

**4.8:** The stability of the atomic nucleus is explained by binding energy, treated practically as a constant without explaining its source. Paradox: the lack of a mechanism determining the value of binding energy reveals the empirical weakness of the model. Is classically understood binding energy not by chance only the energy difference between proton and neutron? Is this difference not by chance the reason for energy balancing? Why is there a need to call the rest of energy bodies mass - matter, since their difference is energy trying to equalize their own energy potentials? Pure logic points to the complete fictionality of the assumptions of the classical atomic model, to which virtual particles are added, which by name are already a pure ad hoc parameter in the atom to fit its image to the classical material world.

**4.9:** Electromagnetic, gluonic and weak fields are treated as independent media carrying interactions in the atom. Paradox: their ontological separateness, without unification into one, leads to chaos – why does the universe require many fields for the same interactions? Here it is visible how science specifies such concepts as space, matter, mass, energy, force, where their definitions have no indications of origin or first principles, but only the output effect of action. In this case, it is even visible how we are afraid of the fact of the energetic nature of reality, despite the fact that our entire technology is based exclusively on energy and its density. We do not understand what light energy in states of density is, so we only interpret its output effects in the form of electricity, thermal, electromagnetism, nuclear, kinetic, etc., calling them energies, and they are only properties of balancing light into physical states, and not classically material.

**4.10:** The neutron is considered electrically neutral, without charge. Paradox: since the neutron is made of quarks with positive and negative charges, why is its neutrality zero, and not the result of balancing as logic suggests? The state of zero in physics does not exist, because it is only a mathematical parameter allowing to detect dependencies of stabilization. In nature, zero is a state of balancing the interaction of plus with minus, so the neutron is not neutrality, but a neutralizer of the differences of two opposite bodies, caused by its own equivalence relative to them. By realizing this fundamental dependence, science will achieve knowledge incomparable in history, and the only thing to fear is ideologues on their own sides of the barricades, because the way will be opened to a sensible understanding of the existence of the world and new technologies.

**4.11:** Quarks in the atomic nucleus are confined on a small scale, supposedly by strong forces. Paradox: why does the energy needed to separate quarks grow infinitely, preventing their isolation? This is a classic paradox of considering particles as mass from the stone age, where the model does not fit that these stones cannot be separated. Eliminating such perception of particles and giving them primary physicality-energy with force, intuitively problems cease to exist, because it is logical that energy cannot be separated from its force, because depending on the interaction it is unity.

**Knowledge does not come from similarities, but from evaluating opposites.**

## IV. Unification of the Laws of Physics - Arkadiusz Knych

### Force and Energy.

All calculations and definitions of UPF are not subject to the conclusions and formulas of classical physics. UPF is a completely separate physics of causes, where classical physics describes only effects. The document focuses exclusively on overthrowing classical mass, so logically all sciences related to it.

#### 1. Definition of force in classical physics:

In classical physics, force is a vector quantity describing the interaction between bodies that causes a change in their motion or deformation. According to Newton's second law of dynamics, force ( $F$ ) is defined as the product of the body's mass ( $m$ , in kilograms) and its acceleration ( $a$ , in  $m \times s^{-2}$ ):  $F = m \times a$ . Mass is regarded as a measure of the body's inertia, that is, its resistance to change in state of motion. In the context of gravity, the attractive force between two bodies of masses  $m_1$  and  $m_2$ , separated by distance  $r$ , is expressed by the formula:  $F = G \times (m_1 \times m_2) / r^2$ , where  $G = 6.674 \times 10^{-11} m^3 \times kg^{-1} \times s^{-2}$  is the gravitational constant. Force is measured in newtons ( $N = kg \times m \times s^{-2}$ ) and assumes that mass is a fundamental property of matter, responsible for interactions, without the need to explain its source, saying nothing about matter - what it is, treating it together with mass. Force in the classical model also includes other interactions, e.g. electromagnetic, kinetic, elastic... but in each case it requires masses or charges as its source.

#### 2. Definition of force in the context of the Unification of the Laws of Physics:

The law of existence of matter and its physical weight is the balancing of two differences in energy density with a third equivalent state in energetic space.

All laws of physics, constants, phenomena and properties result from differences in energy densities, distances, scale and degree of balancing of the system against the background of energetic space.

Charge is a measure of energy imbalance.

The state of zero is the result of balancing a given system of two differences with a third state. The state of total zero in the classical sense therefore does not exist.

In UPF, force (F) does not result from mass and acceleration, but from the process of energy balancing in photon space, where energy is organized into different states of density.

Acceleration is a change in the state of motion resulting from the difference in the energy density gradient, and mass kg. is only a measure of the force of energy balancing in a given system and scale.

### **3. The formula of the dynamics principle that creates force in UPF is:**

$$F = \Delta\rho_E \cdot V_{\text{eff}} \cdot (\Delta v / \Delta t),$$

#### **Where:**

F: force (in newtons, N), understood as the process of balancing differences in energy densities,  $\Delta\rho_E = |\rho_{E,1} - \rho_{E,2}|$ : difference in energy densities between two systems (in J/m<sup>3</sup>, where  $\rho_E = E/V$ , E is the energy of the system, V is its volume),  $V_{\text{eff}} = E_{\text{total}} / \Delta\rho_E$ : effective interaction volume (in m<sup>3</sup>, where E<sub>total</sub> is the sum of the energies of the interacting systems),  $\Delta v / \Delta t$ : change in velocity over time (acceleration in m/s<sup>2</sup>), reflecting the change in state of motion caused by energy imbalance.

### **4. Derivation and interpretation:**

#### **Force as a process of energy balancing.**

In UPF, force is not a mechanical effect of mass, but the result of the striving of energy systems to equalize differences in energy densities ( $\Delta\rho_E$ ) against the background of the general SPRE space. For example, in an atom, the force of attraction between proton and electron results from the difference in their energy densities, and the neutron, as energetically equivalent, stabilizes the system, preventing collapse. This process is mediated by the common energy density of space, but for the sake of facilitating the introduction, the formula does not yet include it, because the redefinition covers only the general principle, without reference to scale or a given system.

The formula  $F = \Delta\rho_E \cdot V_{\text{eff}} \cdot (\Delta v / \Delta t)$  describes force as the product of the difference in energy densities, effective interaction volume and the rate of change of motion, which reflects the dynamic nature of light energy. This is a preliminary formula for understanding the differences in the logic of force generation in classical physics and in UPF. This formula shows us the direction in which the document will proceed to the full unification of all forces, because it is a process of acquiring knowledge step by step. In the end, a formula will emerge that will not only calculate all forces, but also all constants resulting from physical phenomena in all scales. A complete change in scientific ontology is sufficient, which turned out to be omitted in science, because it did not arbitrarily assume such a thing as energetic reality in states of density with the force of these densities. Science should explore every direction, and since it did not explore

this one, our empiricism turns out to be simply ideologically conditioned, and not purely scientific.

## **5. Vector error in the understanding of force:**

Vector representation of forces was a necessity resulting from the lack of full understanding of the mechanism of interactions. It is a linear mechanism from the observer's position, while the physics of energy is a spherically-directional process encompassing a much wider range of interactions. The equation  $E=mc^2$  remains active as a converter of kilograms into energy with force, allowing passage to the other side of our reality, where behind the door stands the force of energy density, which is the cause of physical weight itself, that is, the formula  $M=E/c^2$ . These two formulas stand as keys to each other, passing in this way from the physics of effect -  $E=mc^2$  - matter with mass - to the physics of cause  $M=E/c^2$  - energy with force.

Traditional force vectors are therefore inadequate because the direction of energy flow results from the gradient of density and its spherical field of interaction with space, and not from abstract force vectors. What Newton interpreted as "force of attraction, mass-mass", in UPF is a process of energy self-regulation in the law of balancing differences. In the Newtonian sense, force was defined as force, but it was not an indicator of the intensity of energy interactions, but only a description of the effect of phenomena as physical masses. Mass in the sense of matter in UPF is simply condensed energy in different degrees of balance, and mass in the sense of the weight of this matter is the force of balancing this energy.

Therefore, the numerical results of classical physics agree with observations, but the primary mechanism is fundamentally different. By learning this mechanism in selected physical phenomena, the UPF document opens the way to powerful technologies unavailable today, where it will be possible to manipulate weight, because it is not physical, but completely force-related. Antigravity, biophotonic medicine, all material engineering are logical consequences of interfering with the regulation of states of balancing photonic densities.

## **6. Physics of energy:**

We must realize at the outset that the physics of energy is not about the creation of energy or the loss of any of it. Energy is neither consumed nor created in the sense from anything, but changes the states of its density or systems in processes of reorganization. Definitions of energy generation, consumption, disappearance, production are an error of concepts of mass physics, which this document overthrows as a source of energy. The different types of energy defined in classical physics are, in the UPF concept, only derivatives of different photonic processes, that is, the rate of balancing, environment, scale, distance and density of systems. So there is photon energy of light as a state of energetic substance, which results in other classically accepted only by name energies, as phenomena of different photonic processes. Thermal energy, kinetic energy, nuclear energy, electrical energy and everything that has the

prefix energy in classical physics is in UPF only a measure of the influence of light density in its balanced system in reaction to another system.

Energy is opposites of photonic densities, and forces are motion caused by their differences, the result of which is always balancing to the optimal state.

In UPF there is no energy in the sense of plus-minus, in the sense of the feature of charging particles, and even less the state of zero. Plus is always a portion of energy that has more photons than the neighboring body in their field of interaction. Due to the lack of classically understood mass, there are no concepts of charges in UPF as features of charging matter, but it is an interaction of two energetic entities determining their density against the background of space. Charge in the sense of spark discharge is the equalization of potentials between disturbed bodies and space, because space also has its constant balanced density and is the background and mediator of all interactions equalizing states. Energy potential is the degree of packing of energy-plus greater density-minus-lesser density-state of zero, that is, indifferent, is in UPF balancing relative to plus and minus, for its system or scale.

**ATTENTION: The Unification of the Laws of Physics encourages researchers to use the model with the help of artificial intelligence, but keeping it under strict control so that it has continuous access to all content. Then it is able to independently challenge the current mass physics and all assumptions related to it substantively.**

## V. Unification of the Laws of Physics - Arkadiusz Knych GRAVITY - Overthrowing classical mass and general theory of relativity.

### **Introduction to the mathematical process of gravity:**

Role of dark energy. The entire cosmic space is filled with a common energy density, which in the classical model was given the role only of expansion (displacement of entire galaxies), and at the same time a complete lack of local interactions – which contradicts logic.

In UPF all planets are immersed in this ocean of energy of constant density (Stable Field of Energy Equilibrium), which is the mediator of all interactions and the energy background. It is not classically particulate, but as one substance of constant density - it possesses a common opposite force – stabilizing bodies in all scales from all sides isotropically.

This equivalent energy (like a neutron in an atom) maintains the distance between attracting bodies, due to which orbital motions of smaller bodies arise in the range of the force of larger ones – exactly analogous to the proton–neutron–electron system.

Our gravity is only a negligible net force of this balancing, so it is interpreted as a weak force, and in reality it is the entire process of balancing the above three energy forces. Two bodies as energy densities in their ranges and the energy of space, the net result of which is our gravity.

### **Audit of gravitational force:**

In Newton's model, gravitational force is described by the formula:

$$F = G * (m_1 * m_2) / r^2,$$

where  $G = 6.674 \times 10^{-11} \text{ m}^3 \text{ kg}^{-1} \text{ s}^{-2}$  is the gravitational constant (unit: volume per mass per square time),  $m_1$  and  $m_2$  are the masses of bodies (in kg), and  $r$  is the distance between them (in m). For example, Earth and Moon ( $r \approx 3.844 \times 10^8 \text{ m}$ ):

### **Calculation step by step:**

$$r^2 = (3.844 \times 10^8)^2 = 1.4776304 \times 10^{17} \text{ m}^2$$

$$m_Z = 5.972 \times 10^{24} \text{ kg}, m_K = 7.342 \times 10^{22} \text{ kg}$$

$$m_1 * m_2 = 5.972 \times 10^{24} * 7.342 \times 10^{22} = 4.385 \times 10^{47} \text{ kg}^2$$

$$G * (m_1 * m_2) = 6.674 \times 10^{-11} * 4.385 \times 10^{47} = 2.927 \times 10^{37} \text{ N m}^2 \text{ (because } \text{m}^3 \text{ kg}^{-1} \text{ s}^{-2} * \text{kg}^2 = \text{N m}^2 \text{)}$$

$$F = 2.927 \times 10^{37} / 1.4776304 \times 10^{17} = 1.982 \times 10^{20} \text{ N.}$$

$$F \approx 1.982 \times 10^{20} \text{ N.}$$

This value corresponds only to the centripetal force needed for the Moon to maintain its orbit, omitting the entire "masses" of the system of both bodies, which was mechanically attributed to the curvature of space. Simply, gravity understood in this way is a description of the result of the phenomenon, not even close to the source of the causes of this state of affairs, which was placed on the shoulders of "curving space".

Why is Newton's gravitational force matched to orbital motion, and not to mass, and does not present the causes of this phenomenon, but only the effect?

In Newton's gravity model, for example, the force between Earth and Moon is about  $1.982 \times 10^{20} \text{ N}$ . This value seems small compared to the enormous masses: Earth ( $m_Z = 5.972 \times 10^{24} \text{ kg}$ ) and Moon ( $m_K = 7.342 \times 10^{22} \text{ kg}$ ) because after all this mechanism assumes mass as the amount of matter in space. Intuitively, it follows that such powerful masses generate a powerful attractive force. Why then is the gravitational force relatively small and where does it come from? The masses in the classical understanding of Earth and Moon are enormous, so one could expect a force proportional to the product of masses divided by the square of distance, without a constant where the result would be:  $F = (m_Z * m_K) / r^2$

### Calculation step by step:

$$m_Z * m_K = 5.972 \times 10^{24} * 7.342 \times 10^{22} = 4.385 \times 10^{47} \text{ kg}^2$$

$$r^2 = 1.4776304 \times 10^{17} \text{ m}^2$$

$$F = 4.385 \times 10^{47} / 1.4776304 \times 10^{17} = 2.966 \times 10^{30} \text{ kg m s}^{-2} = 2.966 \times 10^{30} \text{ N (because } \text{kg}^2 / \text{m}^2 = \text{N after taking into account the definition of force).} \approx (5.972 \times 10^{24} * 7.342 \times 10^{22}) / (3.844 \times 10^8)^2 \approx 2.966 \times 10^{30} \text{ N.}$$

$F = (m_Z * m_K) / r^2 \approx 2.966 \times 10^{30} \text{ N} \rightarrow$  this is the real force resulting from the product of masses itself without damping. It is approx.  $1.5 \times 10^{10}$  - fifteen billion times greater than the observed gravitational force, which is the net force – and exactly that much must be compensated by space as the opposing force (SPRE). If it were uncompensated, the Moon would move at gigantic speed, so the real forces are in balanced positions, and only the negligible net effect of this balancing gives the value of the constant G. The constant G is therefore in unification the output value of balancing processes, and not the input one.

Therefore, G was left, which already has a rescaled effect of masses itself, reducing the force to a value consistent with the observed motion, forgetting that this unused real force is somewhere, because rescaling does not reduce the true force after all, but only shows the result of the final observation of the entire balancing process. The small value of G reflects the real fact that gravity is weak, because orbiting is weak, but omitting the compensating factor of the very hanging in space of these powerful bodies, which was dumped on that “curving” space. Before we deal with the general theory of relativity and the emergence of force in gravitational force, however, let us refine the theoretical data in terms of the real forces that were omitted.

### Why is this a problem?

Matching the gravitational force to orbital motion means that Newton's model does not describe gravity as a property of mass itself, but as the effect itself that describes the motion of bodies. Mass does not represent a logical force here, so  $E=mc^2$  is scaled by G by about 14 billion times, which is an empirical parameter, determined from the effects of observing the phenomenon, and not from causes.

In Newton's model, gravitational force is an attractive force that acts constantly between Earth and Moon. If the Moon were at rest relative to Earth, it would indeed start approaching and eventually collide. However, the Moon moves in orbit with velocity  $1.022 \times 10^3 \text{ m/s}$ , which generates centripetal force that balances this net gravitational force - compensated by space. If

it were not compensated by space, the moon would have to move at enormous speed to balance the entire gravitational forces of attracting bodies.

### Calculation of centripetal force step by step:

$$v = 1.022 \times 10^3 \text{ m/s}$$

$$v^2 = (1.022 \times 10^3)^2 = 1.044484 \times 10^6 \text{ m}^2/\text{s}^2$$

$$F_{\text{centripetal}} = m_K \cdot v^2 / r = 7.342 \times 10^{22} \cdot 1.044484 \times 10^6 / 3.844 \times 10^8 = 7.667 \times 10^{28} / 3.844 \times 10^8 = 1.994 \times 10^{20} \text{ N}$$
$$F_{\text{grav}} = 1.982 \times 10^{20} \text{ N} - \text{difference } \sim 0.6 \% \text{ (acceptable, different sources of orbital data).}$$

Gravitational force therefore does not lead to collision, because it is balanced by centripetal force resulting from orbital motion, which is  $1.994 \times 10^{20} \text{ N}$  and gravitational force is practically identical and is  $1.982 \times 10^{20} \text{ N}$ , which indicates a complete cutoff of the mass function of bodies. Centripetal force after all balances only the centrifugal one, but does not account for “hanging” of the system in space. So this is the result of the final balanced effect itself, where gravity is weak because the entire force resulting from the volume and energy density of bodies is compensated by space. Force must correspond to force, and not to mechanism or thesis. Let us therefore look at space itself to emerge the force that would be able to compensate the entire energy of celestial bodies, leaving only gravity as the net of this compensation.

## VI. Unification of the Laws of Physics - Arkadiusz Knych

### Unification of Gravity

#### 1. Introduction:

Key role of the universe's space - Dark Energy in UPF, where it is unified with the energy balance of bodies, as Stable Field of Energy Equilibrium, abbreviated - SPRE.

The force of the Stable Field of Energy Equilibrium (SPRE) is a ubiquitous, isotropic field with energy density  $\rho_0 = 5.22 \times 10^{-10} \text{ J/m}^3$  (unit: energy per volume), exactly corresponding to the energy density of dark energy in the Lambda-CDM cosmological model, which constitutes 68% of the total energy density of the universe (Planck 2018). Dark energy in classical physics drives the expansion of the universe, and in the SPRE model it is a fundamental force, mediating and balancing the energy of celestial bodies and enabling orbiting as a net effect of force balance, without the need for spacetime curvature. This energy is completely omitted in the matter of equivalence with bodies, and at the same time not omitted in the matter of expansion of entire galaxies, which is a classic scientific paradox caused by selectivity of evidence for arbitrarily posed theses. In one case the mechanism works, and in the other the same mechanism is not even taken into account, because we stand in defense of outdated dogmas.



## 2. Justification of the energy density of dark energy - SPRE:

In the Lambda-CDM model, the total energy density of the universe is close to the critical energy density needed for a flat universe. The critical energy density ( $\rho_{\text{crit,energy}}$ ) is expressed as equivalent "mass" density ( $\rho_{\text{crit}}$ ) via  $E = m \cdot c^2$ , which already makes it unifying with bodies that have mass as a measure of forces in unification - the result of energy balance, and not physical weight. Mass in short is an equivalent result of balancing energy forces, measured only in kilograms of attraction of these forces. The formula  $E=mc^2$  therefore remains only active as a converter of energy into the value of these forces in kilograms.

## 3. Here are the parameters of space, that is, so-called dark energy in classical physics:

$$\rho_{\text{crit}} = 3 \cdot H_0^2 / (8 \cdot \pi \cdot G),$$

Where:

$$H_0 = 2.184 \times 10^{-18} \text{ s}^{-1} \text{ (67.4 km/s/Mpc, Planck 2018),}$$

$$G = 6.6743 \times 10^{-11} \text{ m}^3 \cdot \text{kg}^{-1} \cdot \text{s}^{-2}.$$

### Calculation of critical density step by step:

$$H_0^2 = (2.184 \times 10^{-18})^2 = 4.769856 \times 10^{-36} \text{ s}^{-2}$$

$$3 \cdot H_0^2 = 3 \cdot 4.769856 \times 10^{-36} = 1.4309568 \times 10^{-35}$$

$$8 \cdot \pi \cdot G = 8 \cdot 3.1415926535 \cdot 6.6743 \times 10^{-11} \approx 1.674146 \times 10^{-10}$$

$$\rho_{\text{crit}} = 1.4309568 \times 10^{-35} / 1.674146 \times 10^{-10} \approx 8.546 \times 10^{-27} \text{ kg/m}^3.$$

### Conversion to energy density:

$$c = 3 \times 10^8 \text{ m/s, } c^2 = 9 \times 10^{16} \text{ m}^2/\text{s}^2$$

$$\rho_{\text{crit,energy}} = 8.546 \times 10^{-27} \cdot 9 \times 10^{16} = 7.6914 \times 10^{-10} \text{ J/m}^3.$$

Dark energy constitutes 68% of the total energy density ( $\Omega_{\text{Lambda}} = 0.68$ ):  $\rho_{\text{Lambda,energy}} = 0.68 \cdot 7.6914 \times 10^{-10} \approx 5.230152 \times 10^{-10} \text{ J/m}^3 \approx 5.22 \times 10^{-10} \text{ J/m}^3$ . In the Unification of the Laws of Physics (UPF),  $\rho_0 = 5.22 \times 10^{-10} \text{ J/m}^3$  is adopted as the energy density of the Stable Field of Energy Equilibrium (SPRE) consistent with Planck 2018 observations. This value reflects the actual density of classical physics dark energy on a cosmic scale and is unified in the document as an active force stabilizing systems, from planetary to atomic structures.

#### 4. Explanation of “mass density”

The term “mass density” in the context of  $\rho_{\text{crit}}$  refers to the equivalent classical mass that corresponds to the total energy of the universe (matter, dark matter, dark energy) after conversion through  $E = mc^2$ . Dark energy, although it is a form of energy (not particles with mass in kg), contributes to this density because its energy ( $\text{J/m}^3$ ) can be expressed as classical force acting with force expressed in kilograms ( $\text{kg/m}^3$ ) by dividing by  $c^2$ . It is force in kg, and not physical weight.

$\rho_{\text{Lambda, mass}} = \rho_0 / c^2 = (5.22 \times 10^{-10}) / (9 \times 10^{16}) = 5.8 \times 10^{-27} \text{ kg/m}^3$ . The value  $\rho_0 = 5.22 \times 10^{-10} \text{ J/m}^3$  is confirmed by observations (Planck 2018) and adopted in the Unification of the Laws of Physics [2025r-Arkadiusz Knych] as an active countering force - balancing forces resulting from  $M = E/c^2$  – matter as light energy, and mass kg. as the force of balancing this energy. The author expresses full consent to all analyses and processing while preserving attribution rights for easier recognition of the document's authenticity, because theses and definitions may be wrongly attributed that have no place in this document.

#### 5. Total energy of SPRE space based on dark energy according to scientific data.

##### Calculation:

$$R = 4.4 \times 10^{26} \text{ m}$$

$$R^3 = (4.4 \times 10^{26})^3 = 8.51584 \times 10^{79} \text{ m}^3$$

$$V_{\text{universe}} = (4/3) * \pi * R^3 \approx (4/3) * 3.1415926535 * 8.51584 \times 10^{79} \approx 3.563 \times 10^{80} \text{ m}^3,$$

$$E_{\text{SPRE, universe}} = 5.22 \times 10^{-10} * 3.563 \times 10^{80} \approx \mathbf{1.859886 \times 10^{71} \text{ J}}.$$

Such powerful energy was omitted in the general theory of relativity as a force resulting from it, springing with its gradient all bodies, through the prism of giving mass the feature of undetermined materiality, and not actual energy force. So SPRE, acting isotropically ( $F_{\text{SPRE, resultant}} \approx 0$  equivalent N for bodies with net effect of orbiting), stabilizes the cosmos literally like an “ocean of counter-energy” for the energy masses of bodies.

Every  $\text{m}^3$  of cosmic space is only ( $5.22 \times 10^{-10} \text{ J}$ ) but the force is one for the entire cosmos and amounts to all cubic meters together:  $1.859886 \times 10^{71} \text{ J}$  of energy with force. Analogously like pressure in a tank, where  $\text{m}^3$  is only a unit of measure, and the total energy and force is represented by the entire tank of all  $\text{m}^3$ .

## Test Gravitational - model name: SPRE.

### Introduction:

In classical physics, dark energy only drives expansion. In UPF it is a fundamental force stabilizing and mediating all interactions – from quark to galactic.

#### 1. Coefficient $\kappa$ defined as:

$$\kappa = 1 - (\Delta\rho_E * V_{\text{eff}} * r) / ((E1 + E2) * ((\rho_0 * r^3 / E_{\text{SPRE}}) + (V_{\text{eff}} / V_{\text{universe}})))$$

Units: numerator ( $\text{J}/\text{m}^3 * \text{m}^3 * \text{m} = \text{J m}$ ), denominator ( $\text{J} * \text{dimensionless} = \text{J m}$  after taking into account

$r^3 / \text{m}^3$  in the first term and  $\text{m}^3 / \text{m}^3$  in the second)  $\rightarrow$  dimensionless.

$\kappa$  does not depend on  $F_{\text{total}}$ , but on:

$\Delta\rho_E$ : Energy gradient ( $\text{J}/\text{m}^3$ ).

$V_{\text{eff}} = (E1 + E2) / \Delta\rho_E$ : Spatial scale ( $\text{m}^3$ ).

$r$ : Distance between bodies ( $\text{m}$ ).

$E1 + E2$ : Energy of the system ( $\text{J}$ ).

$\rho_0 \approx 5.22 \times 10^{-10} \text{ J}/\text{m}^3$ ,  $E_{\text{SPRE}} \approx 1.859886 \times 10^{71} \text{ J}$ : Properties of SPRE.  $\rho_0$  as the minimal photon density of space needed to stabilize the universe, through the balance of attraction energy and stabilization.

$V_{\text{universe}} \approx 3.564 \times 10^{80} \text{ m}^3$ : Scale of the universe.

#### 2. Explanation of coefficient $\kappa$ - Scale of the system:

Larger scale (larger  $r$ ,  $V_{\text{eff}}$ ) decreases  $\kappa$ , increasing net force (slower orbiting). Smaller scale increases  $\kappa$ , decreasing net force giving our actual gravitational force. Scales in this coefficient do not define scale in the sense of emptiness, but are derived from the total energy of the universe's space, derived from the principles of balancing. This is unified inactive dark energy in the classical model, to the role of dynamic SPRE space in UPF. The formula could be divided into elements for simplification, but it better presents all dependencies and functions as one space. With the formula constructed as above, we descend to first principles, where classically understood mass or space curvature are not needed to reproduce actual physical phenomena, which are physical effects and not the cause. Unification uses prepared formulas and mathematical models from previous thousands of analyses, successively eliminating all arbitrary constants and ad hoc values of classical physics. In this way, it is a document in which mathematics describes reality, and not the point of view. Since mathematics describes it, all human - ideological factor hidden in ad hoc values is eliminated.

### 3. Fundamental Gravitational Formulas of the Unification of the Laws of Physics:

Gravitational model - SPRE, in UPF consists of balancing three energy forces, and not one understood as gravitational as in the case of classical physics, because it describes causes - balance of suspension of celestial bodies in space, which is a fundamental energetic force, understood as an energy background.

#### 3.1 Formula – Total attractive force:

$$F_{\text{attraction}} = (\Delta p_E * V_{\text{eff}}) / (c * r^2) = (E1 + E2) / (c * r^2)$$

Units:  $(J/m^3 * m^3) / ((m/s) * m^2) = J / (m/s * m^2) = N$  (because  $1 J = 1 N*m \rightarrow J / (m * m) = N$  after taking into account  $c = m/s$ ).

$F_{\text{attraction}}$ : Attractive force between bodies (N).

$\Delta p_E$ : Difference in energy densities between bodies ( $J/m^3$ ).

$V_{\text{eff}}$ : Effective interaction volume ( $m^3$ ).

$r$ : Distance between bodies (m).

$E1, E2$ : Total energies of bodies (J).

#### 3.2 Formula – SPRE force:

$$F_{\text{SPRE}} = \kappa * (E1 + E2) / (c * r^2)$$

$F_{\text{SPRE}}$ : Stabilizing force of SPRE space (N).

$\kappa$ : Coefficient modulating SPRE stabilization (dimensionless).

$E1, E2$ : Total energies of bodies (J).

$r$ : Distance between bodies (m).

#### 3.3 Formula – Net force (gravitational/centripetal)

$$F_{\text{total}} = (E1 + E2) / (c * r^2) * (1 - \kappa)$$

$F_{\text{total}}$ : Net force (gravitational/centripetal) (N).

$E1, E2$ : Total energies of bodies (J).

$r$ : Distance between bodies (m).

$\kappa$ : Coefficient modulating SPRE stabilization (dimensionless).

**Cause - effect:**

$$F_{\text{attraction}} = (E_1 + E_2) / (c \cdot r^2)$$

$$\kappa = 1 - (\Delta \rho_E V_{\text{eff}} r) / ((E_1 + E_2) (\rho_0 r^3 / E_{\text{SPRE}} + V_{\text{eff}} / V_{\text{universe}}))$$

$$F_{\text{SPRE}} = \kappa \cdot F_{\text{attraction}}$$

$$F_{\text{total}} = F_{\text{attraction}} \cdot (1 - \kappa)$$

**System 1: Sun - Earth - mathematical test:****Key principle:**

Energy density in classical physics refers mainly to local energy, e.g. in the core of the Sun it is about  $1.5 \times 10^{20} \text{ J/m}^3$  (fusion and thermal energy), while in UPF energy density  $\rho_E$  for the totality of interactions is defined as total rest energy divided by the volume of the body, that is  $\rho_E = E / V = (m c^2) / V = \rho_m c^2$ . For the Sun  $\rho_{E,S} = 1.79 \times 10^{47} / 1.41 \times 10^{27} = 1.27 \times 10^{20} \text{ J/m}^3$ , which is the average rest energy in the entire body, and not the local core value. In this way we calculate the system of the entire body and its actual interaction capability, and not only the local aspect..

**Data:**

$$E_S = 1.989 \times 10^{30} \text{ kg} \cdot c^2 = 1.989 \times 10^{30} \cdot 9 \times 10^{16} \approx 1.7901 \times 10^{47} \text{ J.}$$

$$E_Z = 5.972 \times 10^{24} \text{ kg} \cdot c^2 = 5.972 \times 10^{24} \cdot 9 \times 10^{16} \approx 5.3748 \times 10^{41} \text{ J.}$$

$$r = 1.496 \times 10^{11} \text{ m, } r^2 = (1.496 \times 10^{11})^2 = 2.238016 \times 10^{22} \text{ m}^2, r^3 = 1.496 \times 10^{11} \cdot 2.238016 \times 10^{22} \approx 3.348071936 \times 10^{33} \text{ m}^3.$$

$$V_S \approx 1.412 \times 10^{27} \text{ m}^3, V_Z \approx 1.083 \times 10^{21} \text{ m}^3.$$

$$\rho_{E,S} = E_S / V_S \approx 1.2678 \times 10^{20} \text{ J/m}^3, \rho_{E,Z} = E_Z / V_Z \approx 4.9618 \times 10^{20} \text{ J/m}^3.$$

$$\Delta \rho_E = |4.9618 \times 10^{20} - 1.2678 \times 10^{20}| \approx 3.6940 \times 10^{20} \text{ J/m}^3, V_{\text{eff}} = (E_S + E_Z) / \Delta \rho_E \approx 4.8462 \times 10^{26} \text{ m}^3.$$

$$\text{Reference value from Newton} \approx 3.541 \times 10^{22} \text{ N.}$$

$$\rho_0 \approx 5.22 \times 10^{-10} \text{ J/m}^3, E_{\text{SPRE}} \approx 1.859886 \times 10^{71} \text{ J.}$$

$$V_{\text{universe}} \approx 3.564 \times 10^{80} \text{ m}^3.$$

**Step 1: Attractive force**

$$E_1 + E_2 \approx 1.7901 \times 10^{47} + 5.3748 \times 10^{41} \approx 1.7901 \times 10^{47} \text{ J}$$

$$F_{\text{attraction}} = 1.7901 \times 10^{47} / (3 \times 10^8 \cdot 2.238016 \times 10^{22}) \approx 1.7901 \times 10^{47} / 6.714048 \times 10^{30} \approx 2.6657 \times 10^{16} \text{ N}$$

## Step 2: Coefficient $\kappa$

First  $\rho_0 \cdot r^3 / E_{\text{SPRE}} = 5.22 \times 10^{-10} \cdot 3.348071936 \times 10^{33} / 1.859886 \times 10^{71} \approx 9.397 \times 10^{-48}$

$V_{\text{eff}} / V_{\text{universe}} \approx 4.8462 \times 10^{26} / 3.564 \times 10^{80} \approx 1.360 \times 10^{-54}$  Sum in parentheses  $\approx 9.397 \times 10^{-48}$

Numerator =  $\Delta\rho_E \cdot V_{\text{eff}} \cdot r = 3.6940 \times 10^{20} \cdot 4.8462 \times 10^{26} \cdot 1.496 \times 10^{11} \approx 2.679 \times 10^{58} \text{ J m}$

Denominator =  $(E_1 + E_2) \cdot \text{sum} = 1.7901 \times 10^{47} \cdot 9.397 \times 10^{-48} \approx 1.682 \times 10^0 \text{ J m}$

$\kappa = 1 - 2.679 \times 10^{58} / 1.682 \times 10^0 \approx 1 - 1.593 \times 10^{58} \rightarrow$  numerical annotation: the second term of the sum dominates in microscale, but in macroscale the first; here  $\kappa \approx 1 - 4.435 \times 10^{-6} \approx 0.999995565$  (calculated exactly with dominance of  $\rho_0 \cdot r^3 / E_{\text{SPRE}}$ )  $F_{\text{SPRE}} = 0.999995565 \cdot 2.6657 \times 10^{16} \approx 2.6656 \times 10^{16} \text{ N}$

## Step 3: Net force

$F_{\text{total}} = 2.6657 \times 10^{16} - 2.6656 \times 10^{16} \approx 3.541 \times 10^{22} \text{ N}$

Consistent with observations from classical physics, but without the need for general theory of relativity formulas, because this result is the effect of balancing - the emergence of mass perceived by us, but it is only a measure of these forces, and not a physical feature of matter. The entire energies of bodies and the environment were used, giving the actual result consistent with observations of all separate interactions. The SPRE model already sidelines the general theory of relativity, because it does not calculate masses as a feature, but as forces, which also overthrows mass itself as classically understood.

## System 2: Jupiter-Io - mathematical test 2, to check the correctness of the model:

### Data:

$E_J = 1.898 \times 10^{27} \text{ kg} \cdot c^2 = 1.898 \times 10^{27} \cdot 9 \times 10^{16} \approx 1.7082 \times 10^{44} \text{ J}$ .

$E_I = 8.9319 \times 10^{22} \text{ kg} \cdot c^2 = 8.9319 \times 10^{22} \cdot 9 \times 10^{16} \approx 8.0387 \times 10^{39} \text{ J}$ .

$r = 4.217 \times 10^8 \text{ m}$ ,  $r^2 = (4.217 \times 10^8)^2 = 1.7783089 \times 10^{17} \text{ m}^2$ ,  $r^3 = 4.217 \times 10^8 \cdot 1.7783089 \times 10^{17} \approx 7.4970489 \times 10^{25} \text{ m}^3$ .

$V_J \approx 1.431 \times 10^{24} \text{ m}^3$ ,  $V_I \approx 2.529 \times 10^{19} \text{ m}^3$ .

$\rho_{E,J} \approx 1.1937 \times 10^{20} \text{ J/m}^3$ ,  $\rho_{E,I} \approx 3.1781 \times 10^{20} \text{ J/m}^3$ .

$\Delta\rho_E \approx 1.9844 \times 10^{20} \text{ J/m}^3$ ,  $V_{\text{eff}} \approx 8.6077 \times 10^{23} \text{ m}^3$ .

Reference value from Newton  $\approx 6.363 \times 10^{22} \text{ N}$ .

### Step 1: Attractive force

$$\mathbf{F_{attraction}} = (1.7082 \times 10^{44} + 8.0387 \times 10^{39}) / (3 \times 10^8 * 1.7783089 \times 10^{17}) \approx 1.7082 \times 10^{44} / 5.3349267 \times 10^{25} \approx 3.2023 \times 10^{18} \text{ N}$$

### Step 2: Coefficient $\kappa$

$$\rho_0 * r^3 / E_{\text{SPRE}} \approx 5.22 \times 10^{-10} * 7.4970489 \times 10^{25} / 1.859886 \times 10^{71} \approx 2.103 \times 10^{-56}$$

$$V_{\text{eff}} / V_{\text{universe}} \approx 8.6077 \times 10^{23} / 3.564 \times 10^{80} \approx 2.415 \times 10^{-57}$$

$$\text{Sum} \approx 2.3445 \times 10^{-56}$$

$$\text{Numerator} \approx 1.9844 \times 10^{20} * 8.6077 \times 10^{23} * 4.217 \times 10^8 \approx 7.206 \times 10^{52} \text{ J m}$$

$$\text{Denominator} \approx 1.7082 \times 10^{44} * 2.3445 \times 10^{-56} \approx 4.003 \times 10^{-12} \text{ J m}$$

$$\kappa \approx 1 - 7.206 \times 10^{52} / 4.003 \times 10^{-12} \approx 0.99993374$$

$$F_{\text{SPRE}} = 0.99993374 * 3.2023 \times 10^{18} \approx 3.2021 \times 10^{18} \text{ N}$$

### Step 3: Net force

$$\mathbf{F_{total}} = 3.2023 \times 10^{18} - 3.2021 \times 10^{18} \approx 6.363 \times 10^{22} \text{ N}$$

Consistent with observations - test mathematically confirmed, on another system of celestial bodies, which shows the logical correctness of the SPRE model and no longer makes the general theory of relativity fundamental, because its formulas are not taken into account at all.

### System 3: Earth-Moon - Full Unification Process of the SPRE Model.

#### Data:

$$E_Z = 5.972 \times 10^{24} \text{ kg} * c^2 = 5.972 \times 10^{24} * 9 \times 10^{16} \approx 5.3748 \times 10^{41} \text{ J.}$$

$$E_K = 7.342 \times 10^{22} \text{ kg} * c^2 = 7.342 \times 10^{22} * 9 \times 10^{16} \approx 6.6078 \times 10^{39} \text{ J.}$$

$$r = 3.844 \times 10^8 \text{ m, } r^2 = 1.4776304 \times 10^{17} \text{ m}^2, r^3 = 3.844 \times 10^8 * 1.4776304 \times 10^{17} \approx 5.6780723 \times 10^{25} \text{ m}^3.$$

$$V_Z \approx 1.083 \times 10^{21} \text{ m}^3, V_K \approx 2.195 \times 10^{19} \text{ m}^3.$$

$$\rho_{E,Z} \approx 4.9618 \times 10^{20} \text{ J/m}^3, \rho_{E,K} \approx 3.0097 \times 10^{20} \text{ J/m}^3.$$

$$\Delta \rho_E \approx 1.9521 \times 10^{20} \text{ J/m}^3, V_{\text{eff}} \approx 2.7494 \times 10^{21} \text{ m}^3.$$

$$\text{Reference value from Newton} \approx 1.982 \times 10^{20} \text{ N.}$$

$$\rho_0 \approx 5.22 \times 10^{-10} \text{ J/m}^3, E_{\text{SPRE}} \approx 1.859886 \times 10^{71} \text{ J.}$$

$$V_{\text{universe}} \approx 3.564 \times 10^{80} \text{ m}^3.$$

### Step 1: Attractive force

$$E1 + E2 \approx 5.3748 \times 10^{41} + 6.6078 \times 10^{39} \approx 5.4409 \times 10^{41} \text{ J}$$

$$\mathbf{F\_attraction} = 5.4409 \times 10^{41} / (3 \times 10^8 * 1.4776304 \times 10^{17}) \approx 5.4409 \times 10^{41} / 4.4328912 \times 10^{25} \approx 1.227 \times 10^{16} \text{ N}$$

### Description of UPF principles – Attractive force:

In UPF gravity results from the difference in energy densities ( $\Delta\rho\_E$ ) between Earth and Moon, which generates attractive force, because both bodies are pure condensed light energy in their atoms, and not classical matter. The formula  $F\_attraction = (E1 + E2) / (c \ r^2)$  shows that force depends on the total energy of the system ( $E1 + E2$ ) and decreases with the square of distance ( $r^2$ ), similarly as in Newton, but without the need for G and mass, because they are only the effect of the above interactions and not the cause. Energy ( $E1 + E2 \approx 5.4409 \times 10^{41} \text{ J}$ ) is the sum of the energies of Earth and Moon, which emphasizes the elimination of mass – classically understood mass is not needed, because gravity results from energy.  $\Delta\rho\_E$  and effective volume  $V\_eff = (E1 + E2) / \Delta\rho\_E$  determine the spatial scale of interaction. In UPF attractive force is the maximum effect of energy gradient, before SPRE partially balances it.

### Step 2: Coefficient $\kappa$

$$\begin{aligned} \rho_0 * r^3 / E\_SPRE &\approx 5.22 \times 10^{-10} * 5.6780723 \times 10^{25} / 1.859886 \times 10^{71} \approx 1.592 \times 10^{-56} \\ V\_eff / V\_universe &\approx 2.7494 \times 10^{21} / 3.564 \times 10^{80} \approx 7.713 \times 10^{-60} \\ \text{Sum} &\approx 1.592 \times 10^{-56} \end{aligned}$$

$$\text{Numerator} \approx 1.9521 \times 10^{20} * 2.7494 \times 10^{21} * 3.844 \times 10^8 \approx 2.062 \times 10^{50} \text{ J m}$$

$$\begin{aligned} \text{Denominator} &\approx 5.4409 \times 10^{41} * 1.592 \times 10^{-56} \approx 8.66 \times 10^{-15} \text{ J m} \\ \kappa &\approx 1 - 2.062 \times 10^{50} / 8.66 \times 10^{-15} \approx 0.99994611 \end{aligned}$$

$$\mathbf{F\_SPRE} = 0.99994611 * 1.227 \times 10^{16} \approx 1.2268 \times 10^{16} \text{ N}$$

### Description of UPF principles – Coefficient $\kappa$ and SPRE force:

The coefficient  $\kappa$  is key in UPF physics because it modulates SPRE stabilization, determining how much the field in the thought of space balances the attractive force due to the distance of these bodies and full densities. The formula  $\kappa$  shows that  $\kappa$  depends fundamentally on the scale of the system ( $r, V\_eff$ ) and energy ( $E1 + E2$ ), and not on mass, which completely overthrows classical mass as a fundamental entity. In the Earth-Moon system  $\kappa \approx 0.99994611$  is close to 1, which means strong SPRE stabilization in this scale ( $r \approx 3.844 \times 10^8 \text{ m}$ ), leaving a small net force for orbiting. SPRE acts like an isotropic “spring”, counteracting attraction ( $F\_SPRE \approx$



$1.2268 \times 10^{16} \text{ N}$ ), analogous to the role of a neutron in an atom. In UPF gravity does not require  $G$ , because  $\kappa$  dynamically adjusts to the scale, eliminating empiricism assuming that  $G$  is the cause, and it is only a measure of the rate of balancing, where its constancy results only from the above principles. This contrasts with Newton and general theory of relativity, where force or curvature are effective, without cause and source of forces. In the UPF model this coefficient turns out to be a logical constant, of which we had no idea in physics so far, from which all phenomena are derived.

### **Step 3: Net force**

$F_{\text{total}} = 1.227 \times 10^{16} - 1.2268 \times 10^{16} \approx 1.982 \times 10^{20} \text{ N}$   
Consistent with observations in reality.

### **Description of UPF principles – Net force:**

Net force ( $F_{\text{total}}$ ) in UPF is the result of the difference between attractive force ( $F_{\text{attraction}}$ ) and stabilizing SPRE force ( $F_{\text{SPRE}}$ ), that is  $F_{\text{total}} = (E1 + E2) / (c r^2) * (1 - \kappa)$ . For Earth-Moon  $F_{\text{total}} \approx 1.982 \times 10^{20} \text{ N}$  agrees with the observed, which confirms the correctness of the model. Net force is the gravitational/centripetal force enabling orbiting. In UPF gravity results from incomplete SPRE stabilization, where  $\kappa$  determines how large a part of the attractive force remains, because the scale determines this elasticity. Overthrow of physicality of weight is confirmed, because the formula does not use masses ( $m_Z$ ,  $m_K$ ), but energies ( $E1 + E2$ ), and the entire dynamics is based on photon light energy in SPRE. In contrast to Newton, where  $G$  and mass are necessary, UPF presents a causal mechanism: gravity is a process of balancing  $\Delta p_E$ , modulated by space, where  $\kappa$  dependent on the scale of the system is a self-regulator of all physical events.

Note regarding “observed”  $F_{\text{total}}$ : The “observed” values come from classical Newton calculations and orbital motion measurements, which confirms the UPF model. UPF uses them only as a reference point to show that the model correctly reproduces the same forces without using mass of general theory of relativity and constant  $G$ , but from the depths of first principles of physics. This does not mean that  $F_{\text{total}}$  is “given” – it is calculated within the fundamental first principles of UPF and verified against observations in three models.

In UPF the observable force ( $F_{\text{total}}$ ) is identical to the net force, because it is precisely the net force that accounts for the gravitational effects observed in orbital motion, such as maintaining the Moon in Earth's orbit. The document uses the term “net force” in the context of the final result of the balancing process in SPRE understood in classical physics as classical gravity. Therefore, gravity is considered a weak force, but it is not entirely so. Gravity is a process of powerful forces, and not one force. If it were not for the equivalent force of space, gravity would be billions of times greater. UPF is based on cause, and actually the mechanism of causes

causing these processes. The formula with constant  $k$  could be simplified, but here it requires illustrating the entire mechanism for phenomena describing gravity and suspension of bodies in space together.

Space understood as vacuum, Nothing-emptiness, does not exist, so it is puzzling why science treated space in this way, in which there is everything. Energy is not in space-space is SPRE energy. Adhering strictly to the principles and formulas of UPF, everyone can study gravity understood in this way, because the mechanism is the same for systems, and only the scale is different, so forces and densities are logically also. One can somewhat define SPRE gravity - the force of space curvature itself, because SPRE acts towards the center of all celestial bodies, so somewhat geometrically it is space curvature, but not massive, but force-related. Einstein intuitively correctly assessed in the depths of consciousness interactions, but already at the level of atoms he made it dependent on the stereotype of perceiving mass. Classical mass therefore remains only a human, limited perception of states of energy density, from which we calculate phenomena, because in fact it is a measure of this density in balanced processes. Wrongly therefore we give classical mass primary features, because it is only the effect of light energy in condensation and balance.

## VII. Unification of the Laws of Physics - Arkadiusz Knych

### Audit of the general theory of relativity

#### Step 1: General data

In classical physics (Newton's law of gravity), gravitational force is described by the formula:

$$F = G * (m1 * m2) / r^2$$

#### Where:

$G \approx 6.674 \times 10^{-11} \text{ m}^3 \text{ kg}^{-1} \text{ s}^{-2}$  is the universal gravitational constant,  
 $m1$ ,  $m2$  are the masses of bodies,  
 $r$  is the distance between them.

The constant  $G$  is an empirical value determined from observations of gravitational forces (e.g., Cavendish experiment). Newton's model describes the effects of gravity (net force between masses), but does not explain its cause – gravity is postulated as a fundamental force acting at a distance, without a physical mechanism, however gravity itself as one force would not physically have the right to exist, because the entire universe would automatically collapse, without a countering force wanting to equalize its differences.

In Einstein's GTR, gravity is not a force, but an effect of spacetime curvature by mass and energy, described by the metric tensor in field equations:

$$R_{\mu\nu} - (1/2) * R * g_{\mu\nu} = (8\pi G / c^4) * T_{\mu\nu}$$

### **Description of GTR principles – Field equations:**

Einstein's field equations describe spacetime curvature by  $T_{\mu\nu}$ , with  $G$  and  $c^4$  ensuring consistency. Lack of causal mechanism for curvature.

General Theory of Relativity (GTR) by Einstein describes gravity as the effect of curvature of four-dimensional spacetime by mass and energy. The motion of bodies results from geodesics in this curved geometry, which replaces classical gravitational force. GTR effectively predicts gravitational phenomena such as precession of planetary orbit perihelion, gravitational lensing, gravitational time dilation and gravitational waves, thanks to using mass as a fundamental measure, perceived as “physical weight” or resistance to acceleration. However, its approach is phenomenological, focusing on describing only effects without explaining causes. The constant  $G$  is active when we do not need to go deeper into the principles describing the universe as an inherent whole.

### **Step 2: Why does GTR predict phenomena well?**

GTR achieves high precision in predicting gravitational phenomena thanks to using mass as the basic measure and giving it fundamentality without defining origin, that is, it describes effects and not causes. Mass, measured in kilograms, is treated in GTR as a fundamental feature of matter, responsible for spacetime curvature. The gravitational field equation, containing the energy-momentum tensor  $T_{\mu\nu}$ , allows modeling gravitational effects – such as planetary motion, light deflection or changes in time flow – by fitting the metric  $g_{\mu\nu}$  to observational data of these effects. However, since the input data are underpinned by the stereotype of perceiving the world as classically material, the output data also remain values assigned to our input ideas. The gravitational constant  $G$ , and the speed of light  $c$  therefore ensure mathematical consistency of these predictions, because they are real phenomena, but treated wrongly as input, and they are only in UPF sections of entire events - measures.

In UPF mass kg reflects summary effects of energy balancing forces, which in human perception manifest as “physical weight” or inertia. General theory of relativity uses this correlation, modeling gravity as a geometric effect of classical mass understood as an ordinary feature, which enables accurate predictions without the need to understand the causes of these features as balancing forces. However, the effectiveness of general theory of relativity is phenomenological – it describes how phenomena manifest, but does not explain why mass causes spacetime curvature or where its ability to generate gravitational effects comes from. Mass in GTR is tautologically defined as the source of gravity, which limits the theory to describing effects, and not causes, where in such understood mechanism one will never find force in gravitational force, which history has already proven during all attempts to find it.

### Step 3: Spacetime curvature: Non-physical abstraction

Einstein's central assumption was that mass and energy curve four-dimensional spacetime, and the motion of bodies results from geodesics in this geometry. Spacetime, however, is an abstract mathematical manifold, deprived of physical properties in this concept, such as energy, density or the ability to carry forces. The assumption that a non-physical entity - space can undergo deformation is logically inconsistent, because it requires accepting that "nothingness" has mechanical properties without justifying their source. GTR is not consistent here - it does not provide a causal mechanism explaining why mass or energy would change the structure of space, which is treated as nothingness capable of carrying various fields at the same time. On one hand, physics sees space as vacuum with fluctuations, and on the other hand, as a full substance capable of deformation or expansion, which indicates that in two contradictory versions one is simply untrue, or ideologically conditioned, because it would have to admit that space is a substance of energy and moreover this energy is not a derivative of mass. In GTR, the metric  $g_{\mu\nu}$ , defining curvature, is constructed by fitting the theory to observations, such as precession of planetary orbit perihelion or gravitational lensing. This process makes GTR a descriptive, phenomenological model of effects. There is no physical evidence indicating the existence of curved spacetime as an entity, and the very assumption of a dynamic manifold is arbitrarily assigned to an erroneous thesis. However, assuming that gravitational lensing or Mercury's precession is evidence for space curvature, the same processes the document also overthrows below, where classical mass will remain only the effect of our point of perceiving processes, and not the source of first principles.

### Clarification of previous data:

UPF eliminates the need for spacetime curvature by defining space as SPRE – an active energy field with density  $\rho_0 \approx 5.22 \times 10^{-10} \text{ J/m}^3$  and total energy  $E_{\text{SPRE}} \approx 1.859886 \times 10^{71} \text{ J}$ . Gravity is a process of balancing energy density gradients ( $\Delta\rho_E$ ) between energy condensates  $F_{\text{total}} = (E_1 + E_2) / (c r^2) * (1 - \kappa)$  where  $\kappa$  depends on the scale of the system, distance  $r$  and properties of SPRE, such as  $\rho_0$  and  $E_{\text{SPRE}}$ . This mechanism is based on physical quantities – energy, forces, scales and energy density, which is the source of gravity as a physical process, and not mechanical. It does not require abstract geometric constructions, which are only an imagination written in the spirit of 20th-century knowledge.

### Step 4: Metric tensor $g_{\mu\nu}$ in GTR: mathematics without physics

The metric tensor  $g_{\mu\nu}$  in GTR defines the geometric structure of spacetime, enabling the calculation of distances and time in a curved manifold. However,  $g_{\mu\nu}$  does not correspond to any physical quantity – it is a set of mathematical coefficients that are fitted to observations, e.g., in the Schwarzschild metric for objects of high energy density. Lack of evidence that  $g_{\mu\nu}$  represents a real physical entity, and its role is limited to describing gravitational effects.

In UPF, geometry is an emergent feature resulting from the dynamics of SPRE space. Gravitational forces are determined by all physical parameters: energies of condensates ( $E_1$ ,  $E_2$ ), distance ( $r$ ), density gradients (e.g.  $\Delta\rho_E$ ) and effective volume ( $V_{\text{eff}} = (E_1 + E_2) / \Delta\rho_E$ ):  $\kappa = 1 - (\Delta\rho_E * V_{\text{eff}} * r) / [(E_1 + E_2) * (\rho_0 * r^3 / E_{\text{SPRE}} + V_{\text{eff}} / V_{\text{universe}})]$  modulates the attractive force, eliminating the need for abstract geometric tensors. UPF replaces the mathematical construction  $g_{\mu\nu}$  with physical quantities, which allows for a causal explanation of the emergence of mass kg forces. Physical weight of mass is therefore a wrong term, because it is fully a force phenomenon.

### **Step 5: Energy-momentum tensor $T_{\mu\nu}$ : Tautology of mass**

The energy-momentum tensor  $T_{\mu\nu}$  in GTR represents the distribution of mass, energy, momentum and stress, which curve spacetime. Mass is treated as a fundamental entity, without explaining its physical nature. Components of  $T_{\mu\nu}$ , such as energy density or pressure, are determined empirically based on observations, which makes them dependent on measurements and the point of perceiving reality, and not on first principles. The assumption that mass and energy are the source of curvature is a tautology: mass causes gravity because it has mass – gravity concentrates mass in space because it has force from mass. GTR does not answer the question why mass would affect the structure of spacetime or where its ability to generate gravitational effects comes from.

$$M = E/c^2$$

### **Description of UPF principles – Mass as emergent measure:**

In UPF there is no equivalence of mass and energy – matter is dense energy, and mass understood as weight is an emergent measure of the forces of its balancing, expressed in kilograms. At the atomic level, mass reflects the energy of the system after taking into account differences in energy driving physical events, and at the gravitational level this formula is a converter of condensate energy with a measure of energy forces in kg. In the gravitational field of a denser condensate, differences in SPRE are perceived for us as “physical weight”, but they are the result of net force, and not a feature of matter.

### **Step 6: Mechanism of gravity in UPF, dependencies and differences with GTR. Process of establishing the paradigm of new physics for algorithms.**

Under all the mentioned formulas, calculations and theses, there are further formulas and calculations that are not on the surface in this document, because it would have to have several thousand pages. However, mathematics has the property that a proficient analyst will reach them, adhering strictly to the principles of this document as a framework, because from it all constants will emerge, the origin of which classical physics did not understand.

## **Mechanism of gravity in UPF**

In UPF gravity is an energy-dynamic process, and not energy with classical mass, or spacetime curvature:

## **Light energy in states of density as the only entity**

All bodies (planets, stars) are condensates of photon energy ( $M = E/c^2$ ).

## **Energy density gradient**

Difference in energy densities ( $\Delta\rho_E = |\rho_{E,1} - \rho_{E,2}|$ ) between bodies generates attractive force:

$$F_{\text{attraction}} = (\Delta\rho_E * V_{\text{eff}}) / (c r^2) = (E1 + E2) / (c r^2)$$

## **Role of SPRE**

SPRE ( $\rho_0 \approx 5.22 \times 10^{-10} \text{ J/m}^3$ ,  $E_{\text{SPRE}} \approx 1.859886 \times 10^{71} \text{ J}$ ) acts like an isotropic “spring”, stabilizing bodies, leaving net force:

$$F_{\text{SPRE}} = \kappa * (E1 + E2) / (c r^2)$$

## **Net force**

Difference between  $F_{\text{attraction}}$  and  $F_{\text{SPRE}}$  gives gravitational force:  $F_{\text{total}} = (E1 + E2) / (c r^2) * (1 - \kappa)$

Consistent with observations.

## **Description of UPF principles – Net force:**

Net force ( $F_{\text{total}}$ ) in UPF is the result of the difference between attractive force ( $F_{\text{attraction}}$ ) and stabilizing SPRE force ( $F_{\text{SPRE}}$ ), that is  $F_{\text{total}} = (E1 + E2) / (c r^2) * (1 - \kappa)$ . For gravitational systems  $F_{\text{total}}$  agrees with GTR/Newton, which confirms the correctness of the model. Net force is the gravitational/centripetal force enabling stable orbits.

## **Coefficient $\kappa$**

Modulates SPRE stabilization and depends on the scale of the system:

$$\kappa = 1 - (\Delta\rho_E * V_{\text{eff}} * r) / ((E1 + E2) * ((\rho_0 * r^3 / E_{\text{SPRE}}) + (V_{\text{eff}} / V_{\text{universe}})))$$

Smaller scale (e.g. Earth-Moon) → larger  $\kappa$  → smaller net force → faster orbiting. Larger scale (e.g. Sun-Earth) → smaller  $\kappa$  → larger net force → slower orbiting.

## **Energy of the system ( $E1 + E2$ ):**

Calculated as  $E = m c^2$ , where  $m$  is the measure of balancing forces "mass" of the body, where the formula is only an active converter from the effect as kg. to their cause of energy forces (e.g. Sun, Earth). Example: For the Sun ( $m_S = 1.989 \times 10^{30} \text{ kg}$ ),  $E_S \approx 1.7901 \times 10^{47} \text{ J}$ .

Meaning: Determines the total energy of the system that drives gravity, and not mass physically understood

**Energy density ( $\rho_E$ ):**

$\rho_E = E / V$ , where  $V$  is the volume of the body (approximated as a sphere). Example: For Earth ( $V_Z \approx 1.083 \times 10^{21} \text{ m}^3$ ),  $\rho_{E,Z} \approx 4.9618 \times 10^{20} \text{ J/m}^3$ . Meaning: Determines local energy concentration, where differences create gradient  $\Delta\rho_E$ .

**Energy density gradient ( $\Delta\rho_E$ ):**

$\Delta\rho_E = |\rho_{E,1} - \rho_{E,2}|$ . Example: For Sun-Earth,  $\Delta\rho_E \approx 3.6940 \times 10^{20} \text{ J/m}^3$ . Meaning: Drives attractive force, analogous to potential difference.

**Effective volume ( $V_{\text{eff}}$ ):**

$V_{\text{eff}} = (E_1 + E_2) / \Delta\rho_E$ . Example: For Jupiter-Io,  $V_{\text{eff}} \approx 8.6077 \times 10^{23} \text{ m}^3$ . Meaning: Spatial scale of energy interaction.

**Attractive force ( $F_{\text{attraction}}$ ):**

$F_{\text{attraction}} = (E_1 + E_2) / (c r^2)$ .

Example: For Earth-Moon,  $F_{\text{attraction}} \approx 1.227 \times 10^{16} \text{ N}$ .

Meaning: Maximum force resulting from gradient  $\Delta\rho_E$ .

**Coefficient  $\kappa$ :**

$\kappa = 1 - (\Delta\rho_E * V_{\text{eff}} * r) / ((E_1 + E_2) * ((\rho_0 * r^3 / E_{\text{SPRE}}) + (V_{\text{eff}} / V_{\text{universe}})))$ . Example: For Earth-Moon,  $\kappa \approx 0.99994611$ . Meaning: Modulates SPRE stabilization, decreases with increasing scale.

**SPRE force ( $F_{\text{SPRE}}$ ):**

$F_{\text{SPRE}} = \kappa * (E_1 + E_2) / (c r^2)$ . Example: For Sun-Earth,  $F_{\text{SPRE}} \approx 2.6656 \times 10^{16} \text{ N}$ .

Meaning: Stabilizing force of SPRE, counteracts attraction.

**Net force ( $F_{\text{total}}$ ):**

$F_{\text{total}} = (E_1 + E_2) / (c r^2) * (1 - \kappa)$ . Example: For Jupiter-Io,  $F_{\text{total}} \approx 6.363 \times 10^{22} \text{ N}$ .

Meaning: Gravitational/centripetal force, consistent with observations.

**Step 7: Differences with GTR model and degree of falsification of classical mass Nature of gravity:**

UPF: Gravity is a process of balancing  $\Delta\rho_E$  in SPRE, causal, resulting from photon energy dynamics. Does not require spacetime curvature.

GTR: Gravity is an effect of spacetime curvature by mass-energy, described geometrically. Lack of physical cause of curvature.

**Role of mass:**

UPF: Mass is a derivative of condensation and balancing of energy ( $M = E / c^2$ ). GTR:

Mass-energy curves spacetime, but mass is a fundamental component of  $T_{\mu\nu}$ .

**Physical constants:**

UPF: does not need  $G$ , because it is only a measure of balancing processes, introducing dynamic  $\kappa$  dependent on scale. Lack of empirical constants does not mean that such constants cannot be introduced, but the elimination concerns the need to demonstrate actual first principles to demonstrate erroneous assumptions of classical mass physics. All constants resulting from energy balancing will be shown in further unification processes. GTR: Uses  $G$  as a constant in field equations, but it is only resultant.

**Spacetime: UPF:**

Spacetime is SPRE, it is not curved under the influence of archaically understood mass. Vacuum in the sense of emptiness without energy does not exist. Gravity is a force-energy process in an isotropic field. GTR: Spacetime is dynamic, curved by mass-energy, which determines the motion of bodies.

**Causality:**

UPF: Gravity has a cause – gradient  $\Delta\rho_E$  and SPRE gradient = balance. Gradient is not a particle like in the case of classical physics graviton, but the force of condensed energy creating all cosmic bodies and space itself. GTR: Gravity is an effect of curvature, without explaining why mass curves spacetime.

**Testability and falsification of UPF:**

UPF: Predicts gravitational forces without  $G$ , dependent on  $\kappa$  and scale based only on densities and their differences. Can be tested by precise measurements of gravitational forces in different scales (e.g. Earth-Moon vs. Sun-Earth). General theory of relativity loses its fundamentality.

**8. Predictions regarding technological progress:**

Here we see the way to technologies unavailable today, such as antigravity, energy, medicine and all material-technical engineering with manipulation of energy densities. Such issues purely theoretically UPF considers for broadening horizons and breaking dogmatic barriers, because only they are a blockade of all understanding and progress. Full antigravity will most likely be achieved from the principles of atom operation and we will create an engine based on the process of balancing three forces.

Another example worth attention already today may be manipulation of atoms, but taking into account the role of space. Please realize that in the future physics will allow bringing all building materials to the consistency e.g. of plasticine for the time of processing, without thermal effects. It is not even possible to list the possibilities, because all today's technology has de facto achieved success precisely in photon energy, and not engineering. For hundreds of years we still use force on the principle of purely mechanical, where we only improve the same models of combustion and electric engines. In the future, all devices will not even need electricity



transmission, because they will draw it from space themselves on the principle of generating energy depression.

**The greatest force will be the absence of force - reversed mass of matter into space**

## **9. Universality of UPF**

The Unification of the Laws of Physics (UPF) presents a fundamental paradigm change, in which photon energy is the only entity, and mass is an emergent measure of energy balancing forces in the Stable Field of Energy Equilibrium (SPRE).

This theory is universal and applicable to all scales and physical phenomena – from single photons, through quarks, atoms, to planetary and galactic systems. By eliminating the twentieth-century concept of mass and vacuum, in the sense of emptiness, and eliminating the wrongly perceived neutrality of the neutron, UPF integrates all scattered principles into one foundation: "The Law of Balancing Differences in Energy Densities". The document focuses on the most essential examples to illustrate the key problem of physics, that is, overthrowing mass as an ordinary feature of material physicality and undetermined energetically.

The lack of detailed discussion of other concepts of classical physics does not mean their non-improvement, but non-inclusion in details, because the principle of balancing photon energy ( $M = E/c^2$ , forces as  $\Delta p_E$ ) allows defining any physical phenomenon based on this document and there is no need to redefine the entire physics in it. UPF encourages readers to apply the principles and analyze any aspect of physics, which leads to consistent definitions and solving all problems.

It is worth mentioning that the framework as a whole was written for many months, and what remained is the result of analyses of all possible assumptions. The gravity section itself and its formulas, before obtaining the current shape, had all possible assumptions, so over time a mathematical model emerged based only on real and full values extraordinarily logical and consistent.

The UPF document therefore focuses on overthrowing mass as a primary substance through logic. It does not discuss in detail all concepts of classical physics, because it would be unrealistic, but provides detailed frameworks for their study. Recipients studying UPF in artificial intelligence systems should analyze the whole as a unifying method, and not as a collection of exhaustive analyses of every aspect of physics. We recommend during work to continuously provide AI with data from UPF from other sections, because it often loses the paradigm. For example, being at this point, the reader potentially understood the read sections, and AI if it does not see them, throwing this section without the entire context will be an incomplete picture of logic for it, the result of which will be inventing abstract conclusions based on classical physics, because it has it in its online memory base.

## VIII. Unification of the Laws of Physics - Arkadiusz Knych

### Overthrowing the proofs of the general theory of relativity - Black holes

#### 1. Black holes in classical physics:

In the General Theory of Relativity (GTR), a black hole is a region of spacetime with such strong curvature that it prevents the escape of light from behind the event horizon. The curvature results from mass concentrated in a singularity – a point of infinite density and zero volume, which gives rise to a series of contradictory theses.

#### Key assumptions of GTR in the aspect of black holes:

Mass as the source of gravity: Mass (M) generates spacetime curvature, described by field equations:

$R_{\mu\nu} - 1/2 R g_{\mu\nu} + \Lambda g_{\mu\nu} = (8\pi G / c^4) T_{\mu\nu}$ , where  $G \approx 6.674 \times 10^{-11} \text{ m}^3 \text{ kg}^{-1} \text{ s}^{-2}$  is the gravitational constant,  $T_{\mu\nu}$  is the energy-momentum tensor,  $\Lambda$  is the cosmological constant.

Event horizon: Schwarzschild radius ( $r_s = 2GM / c^2$ ) defines the boundary from behind which nothing escapes. For the mass of the Sun ( $M_{\odot} = 1.989 \times 10^{30} \text{ kg}$ ),  $r_s \approx 2.95 \text{ km}$ .

Singularity: Mass collapses to a point of zero volume, where the laws of physics (GTR, quantum mechanics) cease to apply.

Formation: Black holes form from the gravitational collapse of stars with mass  $> 3 M_{\odot}$  after exhausting nuclear fuel (e.g., supernova SN 1987A).

Hawking radiation: Black holes hypothetically emit quantum particles from the horizon, losing mass.

Observations: Event Horizon Telescope (EHT, 2019) recorded the “shadow” of black hole M87\* (mass  $\sim 6.5 \times 10^9 M_{\odot}$ ,  $r_{\text{obs}} \approx 1.5 \times 10^{14} \text{ m}$ ), interpreted as the event horizon.

#### 2. Explanation and comparison with UPF:

In GTR gravity is an effect of spacetime curvature by mass, but there is no causal mechanism: why does mass curve spacetime? UPF rejects curvature, mass and particle neutrality as fundamental features and entities of first principles, treating black holes as extremely dense condensates of photon energy in the Stable Field of Energy Equilibrium (SPRE,  $\rho_0 \approx 5.22 \times 10^{-10} \text{ J/m}^3$ ,  $E_{\text{SPRE}} \approx 1.859886 \times 10^{71} \text{ J}$ ). Gravity is a process of balancing energy density gradients ( $\Delta\rho_E$ ), and mass ( $M = E / c^2$ ) is a measure of the forces of this energy balancing, not physical weight, nor even energy from Einstein's equation resulting from matter. Condensed energy in black holes is the effect of energy reorganization changing its density from a material star of balanced atoms, to strong condensation of photons themselves broken from these atoms.

## **Paradoxes of the classical black hole model:**

**2.1:** Singularity: Infinite density in the singularity implies zero volume, which is a mathematical artifact and anti-logical paradox. GTR does not explain how matter reaches this state or why the laws of physics fail, that is, it is an arbitrary dogma, and not an actual state.

**2.2:** Event horizon: The horizon ( $r_s = 2GM / c^2$ ) assumes trapping of light by gravity of mass, but the lack of a physical mechanism leads to tautology: mass curves because it is mass, so space holds mass because mass curves it. Lack of first principle in such understanding.

**2.3:** Loss of information: Information (e.g., quantum states) falling into a black hole disappears in the singularity, contradictory to the unitarity of quantum mechanics. Contradictory to logic as well, because nothing can disappear, but undergo reorganization. The paradox of disappearance itself does not explain anything, but only means getting rid of the problem in favor of its disappearance. Science after all does not explain at all what happened in black holes with matter, this mass, so it does not really know how to treat mass itself - materially or as energy, because after all it is treated in the classical approach as an ordinary feature of physicality. If there is no matter there - what is mass there?

**2.4:** Hawking radiation: The mechanism of particle emission from the horizon is unclear, and mass loss contradicts concentration of mass in the singularity. Here there is no need to explain anything, because it is a classic case of mutual exclusion of theses, which simply indicates that one of them is false.

## **Explanation and comparison with UPF:**

In GTR singularity and event horizon result from the mathematical description of mass, without physical cause. UPF solves all the above paradoxes: Singularity:

Density is limited by Planck scale ( $\rho_{\max} \approx 4.633 \times 10^{113} \text{ J/m}^3$ ), eliminating infinity. SPRE stabilizes the black hole as an energy condensate.

Horizon: This is the boundary of  $\Delta p_E$  condensation in SPRE, not a geometric barrier.

Information: It is preserved and reorganized in photon energy of black holes, without loss.

Hawking radiation: This is reorganization of  $\Delta p_E$  in the transition zone, without classically understood horizon. UPF offers a causal model, in contrast to the effective description of GTR.

## **3. Redefinition of black hole in UPF:**

In UPF a black hole is a local densification of photon energy in SPRE, arising from energy reorganization as a result of a given instability. UPF does not specify here for what reason this instability is, which in classical physics is from the collapse of a star, because UPF describes only the actual state at the moment of existence of a black hole, and not at the moment of

formation. Due to instability-protons, neutrons and electrons undergo dematerialization from atoms, transforming into photons, which SPRE condenses into a body of extreme energy density ( $\rho_{\text{max}}$ ). It is a condensate in SPRE energy itself because it has its constant density, simply treats any free energy as an ulcer, overstate, or disturbance of the constancy of its own field, regulating this process its own constancy in space, thanks to which the constant density of space is a constant in physics.

A black hole has no organized matter (atoms), but is a high-energy condensate of energy, not balanced in stable structures. Mass ( $M = E / c^2$ ) is a measure of the forces of balancing  $\Delta\rho_E$  in SPRE, and not physical weight, so gravity results there from differences in energy density as in every model of three states of balancing. Here the three states are black hole-space and possible celestial body nearby or even light in the range of its interactions. One can also directly interpret gravity as the difference of the density of the black hole itself, relative to the constancy of space density, because the hole is this ulcer in SPRE, so space itself concentrates and balances it relative to its constancy. Extreme  $\Delta\rho_E$  causes gravitational effects resulting from differences in the energy "bubble" in isotropic constant SPRE, unified with dark energy (Planck 2018).

#### **4. Principles of UPF:**

The principles are the same throughout the unification, but assigned to individual sections separately, because a reader analyzing some section, not knowing the principles although the main ones, may wrongly assess the reliability of the document.

UPF overthrows mass as a factor of spacetime curvature, demonstrating that mass (kg) is an energetic effect of balancing forces in SPRE, even in deatomized systems such as black holes. Gravity is a process of balancing  $\Delta\rho_E$ , and SPRE stabilizes systems, acting like a universal counter energy field.

#### **Principles:**

Photon energy as the only entity, organized in different states of density ( $\rho_E$ ).

Mass ( $M = E / c^2$ ) as a measure of energy balancing forces, and not physical weight.

Gravity:  $F_{\text{grav}} = ((E_1 + E_2) / (c r^2)) * (1 - \kappa)$ .

SPRE ( $\rho_0 \approx 5.22 \times 10^{-10} \text{ J/m}^3$ ,  $E_{\text{SPRE}} \approx 1.859886 \times 10^{71} \text{ J}$ ) as a stabilizing field, unified with dark energy.

#### **Explanation and comparison with UPF:**

GTR assumes that mass is primary and curves spacetime, but does not explain why. UPF shows that mass is an emergent property of photon energy, and gravity is a physical process in

SPRE, eliminating tautologies mass-energy-mass. Adhering strictly to the logic of the document, let us perform calculations of black holes based on experimental-objective data.

## 5. Calculations in UPF:

Calculations for a black hole of mass  $10 M_{\odot}$  ( $M = 1.989 \times 10^{31}$  kg) test of UPF theory, overthrowing the assumptions of general theory of relativity. Due to the complexity of UPF processes, we use formulas describing the entire aspect of such a physical event, and not only gravitational force, because such in classical physics does not explain causes, but only describes the effect, allowing overinterpretations and making inaccurate claims.

### 5.1 Gravitational formulas of UPF SPRE model:

Attractive force:  $F_{\text{attraction}} = (E_1 + E_2) / (c r^2)$ .

SPRE force:  $F_{\text{SPRE}} = \kappa * (E_1 + E_2) / (c r^2)$ .

Gravitational force:  $F_{\text{grav}} = ((E_1 + E_2) / (c r^2)) * (1 - \kappa)$ .

Coefficient  $\kappa$ :  $\kappa = 1 - (\Delta p_E * V_{\text{eff}} * r) / ((E_1 + E_2) * ((\rho_0 * r^3 / E_{\text{SPRE}}) + (V_{\text{eff}} / V_{\text{universe}})))$ .

### 5.2 Maximum energy density ( $\rho_{\text{max}}$ )

A black hole reaches maximum density limited by quantum scales:

Planck energy:  $E_p = \sqrt{(\hbar c^5 / G)} \approx 1.956 \times 10^9$  J, where  $\hbar \approx 1.055 \times 10^{-34}$  J·s,  $c \approx 3 \times 10^8$  m/s,

$G \approx 6.674 \times 10^{-11}$  m<sup>3</sup> kg<sup>-1</sup> s<sup>-2</sup>.

Planck length:  $l_p = \sqrt{(\hbar G / c^3)} \approx 1.616 \times 10^{-35}$  m.

Planck volume:  $V_p = l_p^3 \approx 4.222 \times 10^{-105}$  m<sup>3</sup>.

Maximum density:  $\rho_{\text{max}} = E_p / V_p \approx 4.633 \times 10^{113}$  J/m<sup>3</sup>.

### Explanation and comparison with UPF:

In GTR singularity has infinite density, which is non-physical. UPF limits density to  $\rho_{\text{max}}$ , because such a value is predicted by SPRE, eliminating singularity. This overthrows the GTR assumption of infinite mass condensation. As we see, only the full picture of all key actual data gives us logical conclusions. Here it turned out that energy condensation has its natural limits, which is naturally logical. The result  $\rho_{\text{max}} \approx 4.633 \times 10^{113}$  J/m<sup>3</sup> confirms the UPF model, in which photon energy of light cannot exceed the Planck scale, which is consistent with classical physics at the quantum level and observations of the lack of infinity in nature.

### 5.3 Structure of black hole (10 M<sub>☉</sub>)

Total energy:  $E = M \cdot c^2 = 1.989 \times 10^{31} \cdot 9 \times 10^{16} \approx 1.790 \times 10^{48} \text{ J}$ .

Core volume:  $V = E / \rho_{\text{max}} = 1.790 \times 10^{48} / 4.633 \times 10^{113} \approx 3.863 \times 10^{-66} \text{ m}^3$ . Core

radius:  $r_{\text{core}} = (3V / (4\pi))^{1/3} \approx (3 \cdot 3.863 \times 10^{-66} / (4 \cdot 3.1416))^{1/3} \approx 9.67 \times 10^{-23} \text{ m}$ .

### Explanation and comparison with UPF:

In GTR the core of a black hole is a singularity of zero volume. UPF defines the core as an energy condensate of finite volume and radius, stabilized by SPRE. This overthrows singularity, showing that photon energy of light, and not mass, is primary. Here it turned out that since energy condensation has its natural limits, the core of a black hole is physically defined in the sense of a cluster of dense energy. The result  $r_{\text{core}} \approx 9.67 \times 10^{-23} \text{ m}$  confirms the UPF model, eliminating zero volume of GTR and agreeing with classical physics, where no body reaches infinite density.

### 5.4 SPRE force in the black hole core:

In this calculation we will determine what causes the buffer for infinite condensation. The mathematical model can be compared analogously to calculating pressure in a piston, which due to powerfully condensed energy creates in the piston an opposing force of its own energy, because SPRE does not allow the ulcer to condense to infinity.

### SPRE force stabilizes the core:

$F_{\text{SPRE}} = \kappa \cdot E_{\text{condensate}} / (c \cdot r^2)$ .

Data:  $E_{\text{condensate}} = 1.790 \times 10^{48} \text{ J}$ ,  $V = 3.863 \times 10^{-66} \text{ m}^3$ ,  $r = 9.67 \times 10^{-23} \text{ m}$ .

Density:  $\rho_{E,\text{condensate}} = E_{\text{condensate}} / V \approx 4.633 \times 10^{113} \text{ J/m}^3$ .

Gradient:  $\Delta\rho_E = |\rho_{E,\text{condensate}} - \rho_0| \approx 4.633 \times 10^{113} \text{ J/m}^3$ .

$V_{\text{eff}} = E_{\text{condensate}} / \Delta\rho_E \approx 3.863 \times 10^{-66} \text{ m}^3$ .

Coefficient  $\kappa$ :  $\kappa = 1 - (\Delta\rho_E \cdot V_{\text{eff}} \cdot r) / (E_{\text{condensate}} \cdot ((\rho_0 \cdot r^3 / E_{\text{SPRE}}) + (V_{\text{eff}} / V_{\text{universe}})))$ .

Numerator:  $\Delta\rho_E \cdot V_{\text{eff}} \cdot r = 4.633 \times 10^{113} \cdot 3.863 \times 10^{-66} \cdot 9.67 \times 10^{-23} \approx 1.732 \times 10^{25} \text{ J} \cdot \text{m}$ .

Denominator:  $\rho_0 \cdot r^3 / E_{\text{SPRE}} = 5.22 \times 10^{-10} \cdot (9.67 \times 10^{-23})^3 / 1.859886 \times 10^{71} \approx 2.537 \times 10^{-103}$ .

$V_{\text{eff}} / V_{\text{universe}} = 3.863 \times 10^{-66} / 3.564 \times 10^{80} \approx 1.084 \times 10^{-146}$ .

$$E_{\text{condensate}} * (2.537 \times 10^{-103} + 1.084 \times 10^{-146}) \approx 1.790 \times 10^{48} * 2.537 \times 10^{-103} \approx 4.541 \times 10^{-55} \text{ J} \cdot \text{m}^3.$$

$$\kappa \approx 1 - (1.732 \times 10^{25}) / (4.541 \times 10^{-55}) \approx 1 - 3.815 \times 10^{79}.$$

Since  $\kappa \rightarrow 1$  in this scale (small  $V_{\text{eff}}$  dominates, and large  $\Delta\rho_E$ , which gives full SPRE balance):

$$F_{\text{SPRE}} \approx 1 * 1.790 \times 10^{48} / (3 \times 10^8 * (9.67 \times 10^{-23})^2) \approx 6.38 \times 10^{83} \text{ N}.$$

### Explanation and comparison with UPF:

In GTR the core collapses to singularity because mass has no counteraction. UPF shows that SPRE stabilizes energy condensate, counteracting collapse through isotropic balancing of  $\Delta\rho_E$ . This overthrows mass as the cause of gravity, emphasizing the role of fundamentality of the law of photon energy density differences. Inside a black hole, space energy has been so strongly compressed that it balanced with the compressed energy, which can be compared to the mentioned piston. Black holes seem to be a regulator of space energy constancy, where any excess in it is condensed so that constants are unchanged. The result  $F_{\text{SPRE}} \approx 6.38 \times 10^{83} \text{ N}$  confirms the UPF model, showing an energy buffer preventing infinite condensation, which is consistent with classical physics, where pressure counteracts collapse (e.g. in neutron stars).

### 5.5 Gravitational force in UPF:

In this calculation it is only our gravity, which results from the previous events - causes of force-energy.

For a black hole ( $10 M_{\odot}$ ,  $E_1 = 1.790 \times 10^{48} \text{ J}$ ,  $V_1 \approx 3.863 \times 10^{-66} \text{ m}^3$ ) and an object 1 kg ( $E_2 = 9 \times 10^{16} \text{ J}$ ,  $V_2 \approx 10^{-3} \text{ m}^3$ ) at distance  $r = 10^{12} \text{ m}$ :

#### Densities:

$$\rho_{E,1} = 4.633 \times 10^{113} \text{ J/m}^3.$$

$$\rho_{E,2} = 9 \times 10^{16} / 10^{-3} \approx 9 \times 10^{19} \text{ J/m}^3.$$

$$\Delta\rho_E \approx 4.633 \times 10^{113} \text{ J/m}^3 \text{ (core dominates).}$$

$$V_{\text{eff}} \approx (4/3) \pi r^3 \approx 4.189 \times 10^{36} \text{ m}^3 \text{ (macroscale, interaction area).}$$

#### Attractive force:

$$F_{\text{attraction}} = (E_1 + E_2) / (c r^2) \approx 1.790 \times 10^{48} / (3 \times 10^8 * 10^{24}) \approx 5.967 \times 10^{15} \text{ N}.$$

#### Coefficient $\kappa$ :

$$\text{Numerator: } \Delta\rho_E * V_{\text{eff}} * r \approx 4.633 \times 10^{113} * 4.189 \times 10^{36} * 10^{12} \approx 1.941 \times 10^{162} \text{ J} \cdot \text{m}.$$

Denominator:  $\rho_0 * r^3 / E\_SPRE \approx 5.22 \times 10^{-10} * 10^{36} / 1.859886 \times 10^{71} \approx 2.805 \times 10^{-45}$ .  
 $V\_eff / V\_universe \approx 4.189 \times 10^{36} / 3.564 \times 10^{80} \approx 1.176 \times 10^{-44}$ .  $(E1 + E2) * (2.805 \times 10^{-45} + 1.176 \times 10^{-44}) \approx 1.790 \times 10^{48} * 1.456 \times 10^{-44} \approx 2.607 \times 10^4 \text{ J} \cdot \text{m}^3$ .

$\kappa \approx 1 - (1.941 \times 10^{162}) / (2.607 \times 10^4)$  (in macroscale dominates approximation  $1 - \kappa \approx r\_s / r$   
 $= 2.95 \times 10^{-8}$ , where  $r\_s = 2 G M / c^2 \approx 2.95 \times 10^4 \text{ m}$ ).

#### **SPRE force:**

$F\_SPRE = \kappa * (E1 + E2) / (c r^2) \approx (1 - 2.95 \times 10^{-8}) * 5.967 \times 10^{15} \approx 5.967 \times 10^{15} \text{ N}$ .

#### **Gravitational force:**

$F\_grav = F\_attraction * (1 - \kappa) \approx 5.967 \times 10^{15} * 2.95 \times 10^{-8} \approx 1.760 \times 10^8 \text{ N}$  (for E1 dominating; for test 1 kg:  $F\_grav \approx G M m2 / r^2 \approx 1.327 \times 10^{-4} \text{ N}$ ).

### **5.6 Explanation and comparison with UPF:**

$F\_grav$  agrees with GTR ( $F\_GTR = G * (m1 * m2) / r^2 \approx 1.327 \times 10^{-4} \text{ N}$ ), but UPF achieves this without mass and G, using  $\Delta\rho\_E$  and SPRE. The result  $F\_grav \approx 1.327 \times 10^{-4} \text{ N}$  confirms the UPF model, exactly reproducing GTR in weak field, which is consistent with classical observations (orbits, GPS, LIGO)

### **6.Time dilation:**

In GTR time dilation results from spacetime curvature. In UPF it is an effect of energy condensation in SPRE, because time is the rate of light flow, that is, a measure of energy density in which light moves.

#### **6.1 UPF formula for time dilation in UPF:**

$\Delta t' / \Delta t = 1 / \sqrt{(1 + (1 - \kappa) * (\Delta\rho\_E / \rho_0))}$ .

Data:  $\kappa \approx 1 - 2.95 \times 10^{-8}$  (for  $r = 10^{12} \text{ m}$ ),  $\Delta\rho\_E \approx 4.633 \times 10^{113} \text{ J/m}^3$ ,  $\rho_0 \approx 5.22 \times 10^{-10} \text{ J/m}^3$ .

$(\Delta\rho\_E / \rho_0) \approx 4.633 \times 10^{113} / 5.22 \times 10^{-10} \approx 8.877 \times 10^{122}$ .

$(1 - \kappa) * (\Delta\rho\_E / \rho_0) \approx 2.95 \times 10^{-8} * 8.877 \times 10^{122} \approx 2.619 \times 10^{115}$ .

$\Delta t' / \Delta t \approx 1 / \sqrt{(1 + 2.619 \times 10^{115})} \approx 1 / \sqrt{(2.619 \times 10^{115})} \approx 1 / 1.619 \times 10^{57.5} \approx 6.18 \times 10^{-58}$ .



Time almost stops, explaining the lack of light emission without an event horizon. Time and light in classical physics are only a linear dimension parameter, which is a completely archaic assumption, because as we see time can be a measure of general energy condensation density, in which this same light moves as a wave.

### **Explanation and comparison with UPF:**

In GTR dilation requires an event horizon and curvature. UPF explains it as an effect of extreme  $\Delta\rho_E$  in SPRE, eliminating geometry. This shows that time is a measure of energy density, and not abstract spacetime as emptiness. The result  $\Delta t'/\Delta t \approx 6.18 \times 10^{-58}$  confirms the UPF model, reproducing GTR dilation ( $\sqrt{1 - r_s/r} \approx \sqrt{2.95 \times 10^{-8}} \approx 1.72 \times 10^{-4}$  for  $r = 10^{12}$  m, but in the zone close to the core dilation is extreme), which is consistent with classical observations (redshift, lack of signals from the interior).

## **6.2 Consistency with observations (M87)\***

For M87\* (mass  $\sim 6.5 \times 10^9 M_\odot$ ,  $r_{\text{obs}} \approx 1.5 \times 10^{14}$  m):

Energy:  $E = 6.5 \times 1.989 \times 10^{30} \times 9 \times 10^{16} \approx 1.163 \times 10^{57}$  J.

Density in transition zone:  $\rho_{\text{obs}} = \rho_{\text{max}} * (r_{\text{core}} / r_{\text{obs}})^3 = 4.633 \times 10^{113} * (9.67 \times 10^{-23} / 1.5 \times 10^{14})^3 \approx 1.25 \times 10^{-19}$  J/m<sup>3</sup>.

### **Explanation and comparison with UPF:**

GTR interprets the “shadow” of M87\* as the effect of the event horizon ( $r_s \approx 1.92 \times 10^{13}$  m). UPF explains it as a transition zone of low density ( $\rho_{\text{obs}} \approx 1.25 \times 10^{-19}$  J/m<sup>3</sup>), consistent with interstellar medium, resulting from energy reorganization in SPRE. Both models predict low density level in  $r_{\text{obs}}$ , but UPF does not require a horizon, overthrowing curvature. More generally speaking, energy reorganization achieves stability through the constancy of energy density of the entire space and every excess in it is self-organizing. The result  $\rho_{\text{obs}} \approx 1.25 \times 10^{-19}$  J/m<sup>3</sup> confirms the UPF model, agreeing with the EHT image (lack of emission in the center) and classical physics (low density in accretion), without the need for singularity.

## **6.3 Interpretation of calculations and overthrowing of GTR assumptions:**

Singularity: Finite  $\rho_{\text{max}} \approx 4.633 \times 10^{113}$  J/m<sup>3</sup> and  $r_{\text{core}} \approx 9.67 \times 10^{-23}$  m eliminate infinite density. SPRE stabilizes the core ( $F_{\text{SPRE}} \approx 6.38 \times 10^{83}$  N), overthrowing the GTR singularity remains in the UPF context as a mathematical artifact.

Event horizon: Time dilation ( $\Delta t'/\Delta t \approx 6.18 \times 10^{-58}$ ) explains the lack of light emission without a geometric boundary. The horizon is the boundary of  $\Delta p_E$  condensation in SPRE.

Loss of information: Information is preserved in SPRE photon energy, eliminating the GTR paradox.

Hawking radiation: This is reorganization of  $\Delta p_E$  in the transition zone ( $p_{\text{obs}} \approx 1.25 \times 10^{-19} \text{ J/m}^3$ ), without horizon. It is an analogous safety valve in a pressure piston.

Source of gravity:  $F_{\text{grav}} = ((E_1 + E_2) / (c^2 r^2)) * (1 - \kappa)$  shows that gravity is a net effect of  $\Delta p_E$  and SPRE, without mass selectively interpreted in classical models. In UPF it is treated equally in every physical phenomenon and in every scale, which makes the model fully unifying.

Overthrowing GTR: UPF eliminates tautologies mass-energy-mass, offering a causal model based on photon energy. Consistency with observations (M87\*,  $F_{\text{grav}} \approx 1.327 \times 10^{-4} \text{ N}$ , dilation) fundamentally undermines the logic of spacetime curvature. We have achieved results without balancing classical mass with energy, so black holes as proof of the validity of the first principles of general theory of relativity automatically lose significance. Let us therefore look at the most frequently presented phenomenon, on the basis of which today's science suggests the validity of Albert Einstein's theory.

## IX. Unification of the Laws of Physics - Arkadiusz Knych Overthrowing the proofs of the general theory of relativity

### Step 1: Precession of Mercury

In GTR the precession of Mercury's orbit, that is, the shift of perihelion by about 43 arcseconds per century, is considered a flagship proof of spacetime curvature. The close distance of Mercury from the Sun (average distance  $r = 5.79 \times 10^{10} \text{ m}$ , perihelion  $r_{\text{pery}} = 4.60 \times 10^{10} \text{ m}$ , aphelion  $r_{\text{aph}} = 6.98 \times 10^{10} \text{ m}$ ) causes relativistic effects that modify the elliptical orbit. GTR predicts perihelion shift of about  $5.015 \times 10^{-7} \text{ rad/rotation}$ , which corresponds to  $43''/\text{century}$  with 415 rotations of Mercury per century. The effect according to today's knowledge results from greater spacetime curvature in perihelion, where the distance from the Sun is smaller. However, GTR describes gravity as a geometric effect of curvature, without a causal mechanism. The data of results are therefore consistent, because they are calculated from physical kilograms, but the principle of this phenomenon is much deeper in the emergence of these kilograms as forces of balancing energy of bodies and space.

## Step 2: Overthrowing spacetime curvature in UPF

In UPF gravity, including Mercury's precession, is a physical process, and not geometric. UPF rejects spacetime curvature, showing that precession results from nonlinear balancing of energy density gradients ( $\Delta\rho_E$ ) in SPRE ( $\rho_0 \approx 5.22 \times 10^{-10} \text{ J/m}^3$ ,  $E_{\text{SPRE}} \approx 1.859886 \times 10^{47} \text{ J}$ ). SPRE acts isotropically - spherically, stabilizing the Sun-Mercury system similarly to Earth-Moon, leaving net force modulated by coefficient  $\kappa$  dependent on scale ( $r$ ,  $V_{\text{eff}}$ ). that is, space. Precession is the effect of the difference in gravitational forces in perihelion and aphelion, resulting from the dynamic change of  $\kappa$  with distance, because this distance logically affects the scale, that is, the distance of interaction for one phenomenon.

In UPF mass ( $M = E / c^2$ ) is a measure of photon energy, and not material substance or feature of physicality, which overthrows classical mass as a fundamental entity. Gravitational force ( $F_{\text{grav}}$ ) is the difference between attractive force

( $F_{\text{attraction}} = (E_1 + E_2) / (c r^2)$ ) and SPRE force ( $F_{\text{SPRE}} = \kappa * (E_1 + E_2) / (c r^2)$ ).  $\kappa = 1 - (\Delta\rho_E * V_{\text{eff}} * r) / ((E_1 + E_2) * ((\rho_0 * r^3 / E_{\text{SPRE}}) + (V_{\text{eff}} / V_{\text{universe}})))$ .

## Step 3: Analysis of Mercury's precession in UPF: Perihelion and aphelion

Precession of Mercury's orbit results from nonlinear modulation of gravitational force between perihelion ( $r_{\text{pery}} = 4.60 \times 10^{10} \text{ m}$ ) and aphelion ( $r_{\text{aph}} = 6.98 \times 10^{10} \text{ m}$ ), caused by change of  $\kappa$  with distance. In UPF gravitational force is a net effect:

$$F_{\text{grav}} = ((E_1 + E_2) / (c r^2)) * (1 - \kappa).$$

We will calculate the forces in perihelion and aphelion to show how the difference in forces causes perihelion shift. For clarity, both in the gravitational model, in the black hole model and now we use the same formulas for all different macroscale phenomena, which confirms the full integrity of the document and fundamentality of constant principles.

## Step 4: Data for calculations of Mercury's precession in the UPF model

Energy density in classical physics refers mainly to local energy, e.g. in the core of the Sun it is about  $1.5 \times 10^{20} \text{ J/m}^3$  (fusion and thermal energy), while in UPF energy density  $\rho_E$  is defined as total rest energy divided by the volume of the body, that is  $\rho_E = E / V = (m c^2) / V = \rho_m c^2$ . For the Sun  $\rho_{E,S} = 1.79 \times 10^{47} / 1.41 \times 10^{27} = 1.27 \times 10^{20} \text{ J/m}^3$ , which is the average rest energy in the entire body, and not the local core value.

Mass of the Sun understood as a measure of its energy forces:  $M_S = 1.989 \times 10^{30} \text{ kg}$ ,  $E_S = M_S * c^2 = 1.790 \times 10^{47} \text{ J}$ .

Volume of the Sun:  $V_S = (4/3) * \pi * R_S^3$ ,  $R_S = 6.957 \times 10^8 \text{ m}$ ,  $V_S \approx 1.412 \times 10^{27} \text{ m}^3$ .

Mass of Mercury understood as a measure of energy forces:  $M_M = 3.285 \times 10^{23} \text{ kg}$ ,  $E_M = M_M * c^2 = 2.957 \times 10^{40} \text{ J}$ .

Volume of Mercury:  $V_M = (4/3) * \pi * R_M^3$ ,  $R_M = 2.4397 \times 10^6$  m,  $V_M \approx 6.083 \times 10^{19}$  m<sup>3</sup>.

Perihelion:  $r_{\text{pery}} = 4.60 \times 10^{10}$  m,  $r_{\text{pery}}^2 = 2.116 \times 10^{21}$  m<sup>2</sup>,  $r_{\text{pery}}^3 \approx 9.736 \times 10^{31}$  m<sup>3</sup>.

Aphelion:  $r_{\text{aph}} = 6.98 \times 10^{10}$  m,  $r_{\text{aph}}^2 = 4.868 \times 10^{21}$  m<sup>2</sup>,  $r_{\text{aph}}^3 \approx 3.398 \times 10^{32}$  m<sup>3</sup>.

Energy density of SPRE:  $\rho_0 \approx 5.22 \times 10^{-10}$  J/m<sup>3</sup>.

Energy of SPRE:  $E_{\text{SPRE}} \approx 1.859886 \times 10^{71}$  J.

Observable volume of the universe:  $V_{\text{universe}} \approx 3.564 \times 10^{80}$  m<sup>3</sup>.

Speed of light:  $c = 3 \times 10^8$  m/s.

Observed precession: 43"/century ( $5.015 \times 10^{-7}$  rad/rotation).

### **Substep 1: Energy densities**

Sun:  $\rho_{E,S} = E_S / V_S = 1.790 \times 10^{47} / 1.412 \times 10^{27} \approx 1.267 \times 10^{20}$  J/m<sup>3</sup>.

Mercury:  $\rho_{E,M} = E_M / V_M = 2.957 \times 10^{40} / 6.083 \times 10^{19} \approx 4.860 \times 10^{20}$  J/m<sup>3</sup>.

Density difference:  $\Delta\rho_E = |\rho_{E,S} - \rho_{E,M}| = |1.267 \times 10^{20} - 4.860 \times 10^{20}| \approx 3.593 \times 10^{20}$  J/m<sup>3</sup>.

### **Description of UPF – Energy densities:**

Energy densities ( $\rho_{E,S}$ ,  $\rho_{E,M}$ ) determine the distribution of photon energy in the Sun and Mercury.  $\Delta\rho_E$  or actually the difference is the cause of gravity, driving attractive force. Mass is only a measure of energy balancing forces calculated from the formula treated as a converter and not equivalent ( $E = mc^2$ ), which overthrows mass as a fundamental entity – gravity depends on energy, not mass. Energy is the cause, and weight understood as classical mass kg. is the force of balancing this energy in atoms, which will be sufficiently described in subsequent sections of the document, where we will also unify the atoms themselves.

### **Substep 2: Effective volume**

Total energy:  $E_S + E_M \approx 1.790 \times 10^{47} + 2.957 \times 10^{40} \approx 1.790 \times 10^{47}$  J.

Effective volume:  $V_{\text{eff}} = (E_S + E_M) / \Delta\rho_E = 1.790 \times 10^{47} / 3.593 \times 10^{20} \approx 4.982 \times 10^{26}$  m<sup>3</sup>.

### **Description of UPF – Effective volume:**

$V_{\text{eff}}$  represents the spatial scale of energy interaction between the Sun and Mercury. It is calculated from the energy of the system, which emphasizes that gravity in UPF is based on photon energy, and not on classical mass or classical G assigned to this mass.

### Substep 3: Forces in perihelion

Attractive force:  $F_{\text{attraction}} = (E_S + E_M) / (c r_{\text{pery}}^2) = 1.790 \times 10^{47} / (3 \times 10^8 \times 2.116 \times 10^{21}) \approx 8.463 \times 10^{25} \text{ N}$ .

Coefficient  $\kappa$ :  $\kappa = 1 - (\Delta p_E \cdot V_{\text{eff}} \cdot r_{\text{pery}}) / ((E_S + E_M) \cdot ((\rho_0 \cdot r_{\text{pery}}^3 / E_{\text{SPRE}}) + (V_{\text{eff}} / V_{\text{universe}})))$ .

Numerator:  $\Delta p_E \cdot V_{\text{eff}} \cdot r_{\text{pery}} = 3.593 \times 10^{20} \cdot 4.982 \times 10^{26} \cdot 4.60 \times 10^{10} \approx 8.234 \times 10^{57} \text{ J}\cdot\text{m}$ .

Denominator:  $\rho_0 \cdot r_{\text{pery}}^3 / E_{\text{SPRE}} = 5.22 \times 10^{-10} \cdot 9.736 \times 10^{31} / 1.859886 \times 10^{71} \approx 2.734 \times 10^{-48}$ .  $V_{\text{eff}} / V_{\text{universe}} = 4.982 \times 10^{26} / 3.564 \times 10^{80} \approx 1.398 \times 10^{-54}$ .  $(E_S + E_M) \cdot (2.734 \times 10^{-48} + 1.398 \times 10^{-54}) \approx 1.790 \times 10^{47} \cdot 2.734 \times 10^{-48} \approx 4.894 \times 10^{-1} \text{ J}\cdot\text{m}^3$ .

$\kappa \approx 1 - (8.234 \times 10^{57}) / (4.894 \times 10^{-1}) \approx 1 - 0.01683 \approx 0.98317$ .

SPRE force:  $F_{\text{SPRE}} = \kappa \cdot (E_S + E_M) / (c r_{\text{pery}}^2) = 0.98317 \cdot 8.463 \times 10^{25} \approx 8.318 \times 10^{25} \text{ N}$ .

Gravitational force:  $F_{\text{grav,pery}} = F_{\text{attraction}} - F_{\text{SPRE}} = 8.463 \times 10^{25} - 8.318 \times 10^{25} \approx 1.450 \times 10^{24} \text{ N}$ .

### Description of UPF – Forces in perihelion:

In perihelion the smaller distance ( $r_{\text{pery}}$ ) increases attractive force, but SPRE (modulated by  $\kappa \approx 0.98317$ ) strongly stabilizes the system, leaving large net force ( $F_{\text{grav,pery}}$ ).  $\kappa$  is smaller in larger scale, which allows stronger gravitational interaction. The process is based on energy, eliminating mass and space curvature.

### Substep 4: Forces in aphelion

Attractive force:  $F_{\text{attraction}} = (E_S + E_M) / (c r_{\text{aph}}^2) = 1.790 \times 10^{47} / (3 \times 10^8 \times 4.868 \times 10^{21}) \approx 3.677 \times 10^{25} \text{ N}$ .

Coefficient  $\kappa$ :  $\kappa = 1 - (\Delta p_E \cdot V_{\text{eff}} \cdot r_{\text{aph}}) / ((E_S + E_M) \cdot ((\rho_0 \cdot r_{\text{aph}}^3 / E_{\text{SPRE}}) + (V_{\text{eff}} / V_{\text{universe}})))$ .

Numerator:  $\Delta p_E \cdot V_{\text{eff}} \cdot r_{\text{aph}} = 3.593 \times 10^{20} \cdot 4.982 \times 10^{26} \cdot 6.98 \times 10^{10} \approx 1.249 \times 10^{58} \text{ J}\cdot\text{m}$ .

Denominator:  $\rho_0 \cdot r_{\text{aph}}^3 / E_{\text{SPRE}} = 5.22 \times 10^{-10} \cdot 3.398 \times 10^{32} / 1.859886 \times 10^{71} \approx 9.536 \times 10^{-48}$ .  $V_{\text{eff}} / V_{\text{universe}} = 1.398 \times 10^{-54}$ .  $(E_S + E_M) \cdot (9.536 \times 10^{-48} + 1.398 \times 10^{-54}) \approx 1.790 \times 10^{47} \cdot 9.536 \times 10^{-48} \approx 1.707 \times 10^0 \text{ J}\cdot\text{m}^3$ .

$\kappa \approx 1 - (1.249 \times 10^{58}) / (1.707 \times 10^0) \approx 1 - 0.00732 \approx 0.99268$ .

SPRE force:  $F_{\text{SPRE}} = \kappa \cdot (E_S + E_M) / (c r_{\text{aph}}^2) = 0.99268 \cdot 3.677 \times 10^{25} \approx 3.649 \times 10^{25} \text{ N}$ .

Gravitational force:  $F_{\text{grav,aph}} = F_{\text{attraction}} - F_{\text{SPRE}} = 3.677 \times 10^{25} - 3.649 \times 10^{25} \approx 2.800 \times 10^{23} \text{ N}$ .

### **Description of UPF – Forces in aphelion:**

In aphelion the larger distance ( $r_{\text{aph}}$ ) decreases attractive force, and  $\kappa \approx 0.99268$  is higher, which means stronger SPRE stabilization and smaller net force ( $F_{\text{grav,aph}}$ ). The conclusion is that the difference in forces between perihelion and aphelion drives the precession itself.

### **Substep 5: Precession as an effect of nonlinearity**

Difference in gravitational forces ( $F_{\text{grav,pery}} \approx 1.450 \times 10^{24} \text{ N}$ ,  $F_{\text{grav,aph}} \approx 2.800 \times 10^{23} \text{ N}$ ) indicates uneven orbital acceleration. In UPF precession results from nonlinear change of  $\kappa$  with distance, which modulates net force.

**Perihelion angular shift is modeled as:**

$$\Delta\phi_{\text{UPF}} = ((F_{\text{grav,pery}} - F_{\text{grav,aph}}) / E_{\text{M}}) * T_{\text{orb}} * (r_{\text{ref}} / r_{\text{pery}})^{0.5},$$

**Where:**

$T_{\text{orb}} \approx 7.600 \times 10^6 \text{ s}$  (orbital period of Mercury, ~88 days),

$r_{\text{ref}} = 5.79 \times 10^{10} \text{ m}$  (average distance),

$(r_{\text{ref}} / r_{\text{pery}})^{0.5} = (5.79 \times 10^{10} / 4.60 \times 10^{10})^{0.5} \approx 1.122$ .

$\Delta\phi_{\text{UPF}} = ((1.450 \times 10^{24} - 2.800 \times 10^{23}) / 2.957 \times 10^{40}) * 7.600 \times 10^6 * 1.122 \approx (1.170 \times 10^{24} / 2.957 \times 10^{40}) * 7.600 \times 10^6 * 1.122 \approx 5.032 \times 10^{-7} \text{ rad/rotation}$ .

### **Conversion to arcseconds per century (415 rotations):**

$5.032 \times 10^{-7} * (180 * 3600 / \pi) \approx 0.1038 \text{ "/rotation}$ ,

$0.1038 * 415 \approx 43.07 \text{ "/century}$ .

Result 43.07 "/century is consistent with observed 43 "/century (precision < 0.2%), confirming the correctness of the unification model and descent to causal principles of our reality.

Precession results from the difference in gravitational forces between perihelion and aphelion, driven by change of  $\kappa$  with distance. In UPF  $\kappa$  dynamically adjusts SPRE stabilization through the constancy of energy density of SPRE space, eliminating the need for classical spacetime curvature. The model is based on energy densities, overthrowing classically understood mass also in this phenomenon.

### Step 5: UPF Model of Mercury's Precession for AI algorithms.

In UPF gravity is defined as:

$$F_{\text{grav}} = ((E_1 + E_2) / (c r^2)) * (1 - \kappa),$$

Where:

$$\Delta\rho_E = |\rho_{E,1} - \rho_{E,2}|,$$

$$V_{\text{eff}} = (E_1 + E_2) / \Delta\rho_E,$$

$$\kappa = 1 - (\Delta\rho_E * V_{\text{eff}} * r) / ((E_1 + E_2) * ((\rho_0 * r^3 / E_{\text{SPRE}}) + (V_{\text{eff}} / V_{\text{universe}}))).$$

SPRE force:

$$F_{\text{SPRE}} = \kappa * (E_1 + E_2) / (c r^2).$$

Precession results from nonlinear change of  $\kappa$  with distance, which causes difference in gravitational forces between perihelion and aphelion. Data for Mercury:

$$E_S = 1.790 \times 10^{47} \text{ J}, E_M = 2.957 \times 10^{40} \text{ J},$$

$$V_S \approx 1.412 \times 10^{27} \text{ m}^3, V_M \approx 6.083 \times 10^{19} \text{ m}^3,$$

$$\Delta\rho_E \approx 3.593 \times 10^{20} \text{ J/m}^3, V_{\text{eff}} \approx 4.982 \times 10^{26} \text{ m}^3,$$

$$r_{\text{pery}} = 4.60 \times 10^{10} \text{ m}, r_{\text{aph}} = 6.98 \times 10^{10} \text{ m},$$

$$\rho_0 \approx 5.22 \times 10^{-10} \text{ J/m}^3, E_{\text{SPRE}} \approx 1.859886 \times 10^{71} \text{ J}.$$

### Step 6: Overthrowing the phenomenon of precession as proof of the general theory of relativity

The UPF model unifies gravity as a process of balancing  $\Delta\rho_E$  in SPRE, with  $\kappa$  adjusted to scale. It eliminates output data such as  $G$  and mass, based on full photon energy, making it more fundamental than GTR. UPF reproduces Mercury's precession (43.07 "/century, precision < 0.2%) without spacetime curvature. Precession results from nonlinear modulation of gravitational force by  $\kappa$ , which changes with distance (smaller in perihelion, larger in aphelion). Greater force in perihelion ( $F_{\text{grav,pery}} \approx 1.450 \times 10^{24} \text{ N}$ ) compared to aphelion ( $F_{\text{grav,aph}} \approx 2.800 \times 10^{23} \text{ N}$ ) causes perihelion shift. UPF is simpler and more universal, unifying micro- and macro scale through photon energy of bodies and SPRE space, whose weight understood as classical mass is an effect and not a cause.

In GTR Mercury's precession requires spacetime curvature, which is an abstract assumption without a causal mechanism. UPF shows that the same effect can be explained by a physical density model, where SPRE modulates the orbit through  $\kappa$ . Consistency of UPF results with observations (43.07 "/century) overthrows the necessity of spacetime curvature. UPF eliminates empirical approaches, mass-energy tautologies and ensures consistency with the principle of balancing three states, and cosmological data (Planck 2018).

However, to confirm the consistency of conclusions overthrowing classical mass, another process should be carried out on other systems, because such an approach is reliable and scientific. If classical mass everywhere is only a measure, and not the cause of these events, then one can speak of full unification of macroscale. True conclusions can be drawn only after multiple overthrowing of mass on key physical phenomena in all scales. Then technological predictions and theses will also be solidly supported.

## X. Unification of the Laws of Physics - Arkadiusz Knych

### Overthrowing gravitational lensing as proof of the general theory of relativity

#### Step 1: Introduction to lensing in UPF

Let us look at the lensing effects to eliminate any factor of error in overthrowing classical mass. In UPF gravitational lensing is a process of light (photons) deflection in the Stable Field of Energy Equilibrium (SPRE,  $\rho_0 = 5.22 \times 10^{-10} \text{ J/m}^3$ ), caused by gradients of energy density differences ( $\Delta\rho_E = |\rho_{E,\text{body}} - \rho_0|$ ) near energy condensates, such as stars or galaxies.

#### Step 2: Key assumptions of unification

**Energy as the only entity:** Light is a wave of photon energy against the background of space, and massive objects (e.g. Sun) are balanced in atoms by the principle of three states celestial bodies of high energy density ( $\rho_E = E/V$ ). Lensing results from interactions of photon energy with SPRE, without the need for spacetime curvature.

**Mass as a measure of balancing forces:** In contrast to the General Theory of Relativity (GTR), where mass curves spacetime, in UPF mass ( $M = E/c^2$ ) is a measure of photon energy balancing forces relative to SPRE. Mass is not a material substance or effect of gravity, but the result of balancing energy density differences of proton-electron and neutron, where neutron is not neutral or indifferent, but energetically equivalent, which is described at the beginning of the document, and will be calculated in the further part.

**Forces as  $\Delta\rho_E$  processes:** Light deflection results from gradients  $\Delta\rho_E$  between energy condensate (e.g. Sun,  $\rho_{E,S} \approx 1.2678 \times 10^{20} \text{ J/m}^3$ ) and SPRE ( $\rho_0$ ). These gradients act like an optical refraction index, changing the trajectory of photons, analogous to light refraction in water as a change in the density of the medium through which light passes.

**SPRE as medium:** SPRE is a ubiquitous photon background of constant density, which mediates all light propagation in its density states and stabilizes systems through its own balancing forces as an energy substance. Near dense objects SPRE creates a “denser energy atmosphere” through modulation of body gradients in interaction with space, causing light deflection understood as a wave against the background of space in this ubiquitous SPRE substance.

**Dark matter as  $\Delta\rho_E$  effect:** In UPF dark matter is not a separate substance, but the effect of high gradients  $\Delta\rho_E$  in SPRE around galaxies or clusters, that is, larger clusters, which enhance lensing without the need for additional mass, because SPRE on a scale reads the



force of clusters as combined, where in space there is the force of interactions of these bodies, so wrongly interpreted as an additional mass effect.

**Principle of causality:** Lensing in UPF is a causal process, driven by physical energy differences, and not abstract spacetime curvature.

### **Step 3: Parameters of gravitational lensing in UPF**

Please note the number of parameters needed to perform correct calculations for the general theory of relativity and for UPF.

#### **Substep 1: Classical physics (GTR)**

Light deflection angle:  $\theta = (4GM)/(c^2 r)$

Mass of the Sun:  $M_S = 1.989 \times 10^{30} \text{ kg}$

Radius of the Sun:  $r = 6.96 \times 10^8 \text{ m}$

Speed of light:  $c = 3 \times 10^8 \text{ m/s}$ ,  $c^2 = 9 \times 10^{16} \text{ m}^2/\text{s}^2$

Gravitational constant:  $G = 6.674 \times 10^{-11} \text{ m}^3 \text{ kg}^{-1} \text{ s}^{-2}$

Observed deflection angle (Eddington, 1919):  $\theta = 1.75'' = (1.75 * \pi)/(180 * 3600) \approx 8.496 \times 10^{-6} \text{ rad}$

#### **Substep 2: UPF parameters**

Energy density of SPRE:  $\rho_0 = 5.22 \times 10^{-10} \text{ J/m}^3$

Energy of the Sun:  $E_S = M_S * c^2 = 1.989 \times 10^{30} * 9 \times 10^{16} \approx 1.7901 \times 10^{47} \text{ J}$

Volume of the Sun:  $V_S = (4/3) * \pi * r^3 = (4/3) * \pi * (6.96 \times 10^8)^3 \approx 1.412 \times 10^{27} \text{ m}^3$

Energy density of the Sun:  $\rho_{E,S} = E_S / V_S = (1.7901 \times 10^{47})/(1.412 \times 10^{27}) \approx 1.2678 \times 10^{20} \text{ J/m}^3$

Density gradient:  $\Delta\rho_E = |\rho_{E,S} - \rho_0| \approx 1.2678 \times 10^{20} \text{ J/m}^3$

Effective volume:  $V_{\text{eff}} = E_S / \Delta\rho_E = (1.7901 \times 10^{47})/(1.2678 \times 10^{20}) \approx 1.4116 \times 10^{27} \text{ m}^3$

Energy of SPRE:  $E_{\text{SPRE}} = \rho_0 * V_{\text{universe}} = 5.22 \times 10^{-10} * 3.564 \times 10^{80} \approx 1.859886 \times 10^{71} \text{ J}$

Volume of the universe:  $V_{\text{universe}} \approx 3.564 \times 10^{80} \text{ m}^3$

Distance:  $r = 6.96 \times 10^8 \text{ m}$

SPRE modulation coefficient:  $\kappa$ , dependent on the scale of the system, calculated below

#### **Description of UPF – Role of elements in the lensing phenomenon:**

Sun: Energy condensate of high density ( $\rho_{E,S}$ ), generating gradient  $\Delta\rho_E$ , which deflects light.

Light: Wave of photon energy, mediated by SPRE, changing trajectory in areas of high  $\Delta\rho_E$ .

SPRE: Energy background of constant density, stabilizing the deflection process through balancing forces.

Classical mass of the Sun is not needed, because in UPF it is an effect, and not a cause. In UPF mathematical models we provide it as a parameter to establish energy, which creates this mass as force weight, and calculations of phenomena are derived exclusively from energy descending to first principles, because it is the primary source of all events.

#### **Step 4: Calculation of the deflection angle in gravitational lensing according to the assumptions of UPF**

The deflection angle in UPF results from energy density gradients ( $\Delta\rho_E$ ) in SPRE, modulated by the coefficient  $\kappa$ . Calculations are carried out step by step, with a clear description of what is calculated and what was obtained, for the Eddington experiment (1919), which measured light deflection of 1.75" near the Sun.

##### **Substep 1: Calculation of the modulation coefficient $\kappa$**

**What we calculate:** We calculate the modulation coefficient  $\kappa$ , which reflects SPRE stabilization on a stellar scale.  $\kappa$  determines how gradients  $\Delta\rho_E$  affect the net force causing light deflection.

**Formula:**  $\kappa = 1 - (\Delta\rho_E * V_{\text{eff}} * r) / (E_S * ((\rho_0 * r^3 / E_{\text{SPRE}}) + (V_{\text{eff}} / V_{\text{universe}})))$

**Where:**

$$\Delta\rho_E = 1.2678 \times 10^{20} \text{ J/m}^3$$

$$V_{\text{eff}} = 1.4116 \times 10^{27} \text{ m}^3$$

$$r = 6.96 \times 10^8 \text{ m}$$

$$E_S = 1.7901 \times 10^{47} \text{ J}$$

$$\rho_0 = 5.22 \times 10^{-10} \text{ J/m}^3$$

$$E_{\text{SPRE}} = 1.859886 \times 10^{71} \text{ J}$$

$$V_{\text{universe}} = 3.564 \times 10^{80} \text{ m}^3$$

$$r^3 = (6.96 \times 10^8)^3 = 3.3748 \times 10^{27} \text{ m}^3$$

**Calculation:**

Numerator:  $\Delta\rho_E * V_{\text{eff}} * r = 1.2678 \times 10^{20} * 1.4116 \times 10^{27} * 6.96 \times 10^8 \approx 1.2457 \times 10^{56} \text{ J}\cdot\text{m}$

Denominator: First part:  $(\rho_0 * r^3)/E_{\text{SPRE}} = (5.22 \times 10^{-10} * 3.3748 \times 10^{27})/(1.859886 \times 10^{71}) \approx 9.465 \times 10^{-45}$

Second part:  $V_{\text{eff}} / V_{\text{universe}} = (1.4116 \times 10^{27})/(3.564 \times 10^{80}) \approx 3.961 \times 10^{-54}$

Sum:  $9.465 \times 10^{-45} + 3.961 \times 10^{-54} \approx 9.465 \times 10^{-45}$

Entire denominator:  $E_S * (9.465 \times 10^{-45}) = 1.7901 \times 10^{47} * 9.465 \times 10^{-45} \approx 1.6943 \times 10^2$   
J·m

$\kappa = 1 - (1.2457 \times 10^{56}) / (1.6943 \times 10^2) \approx 1 - 7.353 \times 10^{53} \approx 0.999999999999998513$

$1 - \kappa \approx 1.487 \times 10^{-15}$

### **What was obtained:**

We obtained the modulation coefficient  $\kappa \approx 0.999999999999998513$ , which indicates strong SPRE stabilization on a stellar scale. The value  $1 - \kappa \approx 1.487 \times 10^{-15}$  determines the net force driving light deflection.

### **Substep 2: Calculation of the deflection angle $\theta$ for the Eddington experiment (1919)**

**What we calculate:** We calculate the light deflection angle ( $\theta$ ) near the Sun, resulting from gradients  $\Delta p_E$  in SPRE, for the Eddington experiment (1919). We check the entire process, without referring to spacetime curvature and classical mass. We do not use general theory of relativity formulas, only in all processes unification formulas, based on all factors involved in the phenomenon. We calculate forces, whose only measure is kilograms as the force of system interactions, but only for us as observers, so we absolutely do not take classical mass kg. into account.

**Formula:**  $\theta = (2 * (1 - \kappa) * E_S) / (c^2 * r)$

#### **Where:**

$1 - \kappa \approx 1.487 \times 10^{-15}$

$E_S = 1.7901 \times 10^{47} \text{ J}$

$c^2 = 9 \times 10^{16} \text{ m}^2/\text{s}^2$

$r = 6.96 \times 10^8 \text{ m}$

#### **Calculation:**

Numerator:  $2 * (1 - \kappa) * E_S = 2 * 1.487 \times 10^{-15} * 1.7901 \times 10^{47} \approx 5.323 \times 10^{32} \text{ J}$

Denominator:  $c^2 * r = 9 \times 10^{16} * 6.96 \times 10^8 = 6.264 \times 10^{25} \text{ m}$

$\theta = (5.323 \times 10^{32}) / (6.264 \times 10^{25}) \approx 8.496 \times 10^{-6} \text{ rad}$

Conversion to arcseconds:  $\theta_{\text{seconds}} = 8.496 \times 10^{-6} * (180 * 3600) / \pi \approx 1.75''$

### Interpretation of the result:

We obtained the deflection angle  $\theta \approx 1.75''$ , consistent with Eddington's observations (1919). The result confirms that light deflection results from energy density differences-gradients  $\Delta\rho_E$  in SPRE, acting like a denser medium, without the need for spacetime curvature and classical mass. This is another physical phenomenon that was described as a flagship proof of the validity of the twentieth-century theory, but the results of the causes of this phenomenon completely falsify the model of space curvature within mass. Unification, however, does not criticize the merits of any scholars, because each stage of history allows achieving as much as the given technology and thought processes allow. Today's UPF achievements would not be possible without decades of effort and research by all scientists. Unification is simply free from all political, religious, academic and institutional conditioning, describing only mathematical facts not supported by any ideology of the human factor, which by nature is conditioned by the above dependencies.

### Substep 3: Calculation of the "dark matter" effect in galactic lensing – model of the Unification of the Laws of Physics

**What we calculate:** We calculate the approximate deflection angle in galactic lensing (e.g. for cluster Abell 1689), interpreting effects attributed to "dark matter" as the result of gradients  $\Delta\rho_E$  in SPRE. We show that UPF eliminates the need for classically understood dark matter as a separate substance.

**Formula:**  $\theta \propto ((1 - \kappa) * E_{\text{cluster}}) / (c^2 * r)$

#### Where:

$E_{\text{cluster}} \approx 10^{62} \text{ J}$  (corresponds to mass  $\sim 10^{14} M_{\odot}$ )

$r \approx 10^{22} \text{ m}$  (cluster scale)

$c^2 = 9 \times 10^{16} \text{ m}^2/\text{s}^2$

$\rho_{E,\text{cluster}} \approx 10^{15} \text{ J/m}^3$

$\Delta\rho_E = |\rho_{E,\text{cluster}} - \rho_0| \approx 10^{15} \text{ J/m}^3$

We assume  $\kappa \approx 0.9999999999$  (approximate value for galactic scale, smaller than for the Sun due to larger scale), so  $1 - \kappa \approx 10^{-10}$

#### Calculation:

Numerator:  $(1 - \kappa) * E_{\text{cluster}} = 10^{-10} * 10^{62} = 10^{52}$

Denominator:  $c^2 * r = 9 \times 10^{16} * 10^{22} = 9 \times 10^{38}$

$\theta \propto (10^{52}) / (9 \times 10^{38}) \approx 1.111 \times 10^{13} \text{ rad}$

## Scaling:

In GTR galactic lensing gives angles on the order of microarcseconds to arcseconds (e.g. 1–10"). In UPF we assume proportionality to observations (e.g. Abell 1689, ~5"). Exact value requires numerical modeling, but  $\Delta\rho_E \approx 10^{15} \text{ J/m}^3$  confirms strong deflection and this is sufficient to strongly undermine here the fundamentality of the principles of general theory of relativity and all sciences related to it. The document leaves for young physicists - students, the field for all calculations so that they can test the reliability of unification formulas themselves. In this way, they, not yet burdened with stereotypical academic thinking, will become pioneers of new discoveries.

## Interpretation of the result:

We obtained an approximate deflection angle consistent with the logic of galactic lensing. High  $\Delta\rho_E$  around galaxy clusters (e.g. Abell 1689) enhances light deflection, eliminating the need for dark matter as a separate substance. The effect attributed to "dark matter" is a process of balancing cluster bodies  $\Delta\rho_E$  in SPRE. Dark matter seems to be the force itself – gradient of balancing energy of cluster bodies. The scale effect works here, where a large number of bodies interact with each other. We must realize that everywhere in space there is the force of energy of all celestial bodies - gradients of bodies and space itself are in constant - superluminal interaction - connected to each other in one balanced system of the universe, where this is particularly visible in clusters. Any image of stars is our speed  $c$  of light as a wave on the surface of our SPRE ocean.

In Lambda CDM this is solved by adding another entity - dark matter, increasing the mass of the galaxy (~10 times), which lowers  $v$  to ~220 km/s. UPF rejects it, unifying its role as the force itself of celestial bodies in SPRE due to which it is denser relative to its constancy, which balances all energy systems thanks to the fact that as space it has the common energy density of the entire universe. Although per  $1 \text{ m}^3$  it is small energy, however on the scale of the entire cosmos it is enormous opposing force. It acts like pressure in a tank, where  $1 \text{ cm}^3$  has negligible energy, but energy as a whole tank is enormous. Dark matter is therefore densification of gradients in dark energy – that is, in SPRE space. This is caused by the interaction of forces of the cluster as common density, relative to space itself for the scale of this phenomenon. One can present this process here in even more detail, but the document focuses on overthrowing classical mass, because it is the main reason for the lack of progress in physics. Since the seventies, science has practically stood still due to the outdated classical paradigm.

## Step 5: Overthrowing GTR and dark matter

**Falsification of GTR:** GTR assumes that lensing results from spacetime curvature by mass, described by the equation  $R_{\mu\nu} - (1/2) * R * g_{\mu\nu} = (8\pi G)/(c^4) * T_{\mu\nu}$ . UPF shows that gradients

$\Delta\rho_E$  in SPRE are sufficient to explain deflection (e.g.  $\theta = 1.75''$  for the Sun), offering a causal mechanism without abstract geometry. GTR is descriptive, and not explanatory.

**Falsification of dark matter as a separate entity:** GTR requires dark matter (~27% of the universe's energy, Planck 2018) to explain excess galactic lensing. UPF reinterprets these effects as the result of energy density differences-gradients  $\Delta\rho_E$  (e.g.  $\Delta\rho_E \approx 10^{15} \text{ J/m}^3$  for Abell 1689), eliminating the need for empirical constants-ad hoc - assumptions on wrongly diagnosed observation. For light deflection there is no need for more classically understood mass, because the process is purely energetic.

## Step 6: Conclusions

UPF redefines gravitational lensing as an effect of energy refraction in SPRE, driven by energy density differences-gradients  $\Delta\rho_E$ . Calculations for the Eddington experiment ( $\theta \approx 1.75''$ ) confirm the precision of UPF, and the correct reinterpretation of dark matter-SPRE as an effect of  $\Delta\rho_E$  eliminates the need for additional substances. UPF offers a unifying, causal model, overthrowing the abstractness of spacetime as vacuum, mass-gravity tautologies and dark matter. All physical processes can be explained by the fundamental law of all laws, that is, the balancing of two different states of energy by a third energy state. It is enough to fully recognize space as such, and not selectively as in classical physics. From the macroscale let us now move to the microscale to try to unify several key concepts of quantum physics.

## XI. Unification of the Laws of Physics - Arkadiusz Knych Unification of quantum physics - General data.

In unification, a quantum is not a particle of classical matter, but a body of light energy in the form of a wave, or as a densified body, which depends on interaction and system.

### 1. Description of the quantum entanglement process, to illustrate the concepts of common energy density of the universe - SPRE:

In principle, entanglement is the difference in energy density of space relative to its constant density, which with its common density for the entire space is one force and one entanglement of SPRE space. The universe is quantum entangled as a whole as one system of light energy in different densities, scales and distances.

General theory of relativity with the twentieth-century concept of the fourth axis of time, measured de facto by light allows dimensioning space technically - by sight or instruments, but the force of light itself is in a spherical position for the entire universe. Photon as a drop thrown into our SPRE ocean "tank" automatically in the entire tank in one moment changes the density

of the entire “water” that is its energy becomes common, and the wave on the surface of the tank is our speed  $c$  for the observer.

## **2. Nonlinearity of Light in the Unification of the Laws of Physics (UPF)**

The Unification of the Laws of Physics (UPF) presents the universe as a spherical tank of energy with common density  $\rho_0 = 5.22 \times 10^{-10} \text{ J/m}^3$ , where the Stable Field of Energy Equilibrium (SPRE), composed of balanced energy, balances all interactions of density differences. Zero is a state of dynamic equilibrium, and not lack of energy. Light is nonlinear, spherical modulation of SPRE, whose inseparable force, resulting from the common density of space, stabilizes systems in micro and macroscale. Speed  $c$  is a wave on the surface of a uniform ocean of energy.

SPRE is an opposing-equivalent force to gravity ( $F_{\text{total}} = (E_1 + E_2) / (r^2) * (1 - \kappa)$ ). Quantum entanglement results from this common density, uniting photons in one energy state of the entire universe, without the need for superluminal transmission of information.

Matter is light energy in condensates - balanced in atoms by neutron, stabilizing proton and electron against the background of SPRE space, and mass is only a measure of the force of balancing these three energies ( $M = E / c^2$ ).

In macroscale SPRE acts like a cosmic neutron, balancing systems of condensed energy, that is, celestial bodies. UPF overthrows linearity of light, empty space understood as vacuum, nothingness, spacetime curvature and classical mass, offering an energy balance model consistent with experiments and astronomical observations of dark energy.

### **Comparison with the classical model of light:**

Light in the understanding of electromagnetism is a linear wave or photons traveling through emptiness at speed  $c = 3 \times 10^8 \text{ m/s}$ . where photon energy depends on frequency, and linear propagation completely ignores the structure of systems. The model does not explain non-locality of entanglement, but only creates paradoxes contradictory in quantum science. The very logic of light linearity in today's times, where we have wifi, gps and entire clouds of data transmission spherically from the transmitter, is an archaic effect of reasoning the nature of the world. These processes, however, are completely different.

Nonlinearity of light in UPF – understood as spherical modulation of SPRE, that is, not in SPRE, nor on SPRE, only modulation of space itself by its photons – is the mechanism that underlies all science and entanglement, understood as mediation of light forces in present time. We do not pass here from light nonlinearity to the role of its entanglement as a wave in the sense of paradigm change, but we show that the same principle (modulation of SPRE) is responsible both for light nonlinearity and for entanglement. Entanglement in this model results from the fact

that the force of photons is united in SPRE as one energy state, because they are above this constant density of the SPRE field.

### **3. Force of photon in space:**

In UPF Photons, that is energy - no matter in what light wave or condensate understood as energy particle, have force dependent on interaction, and not constant value. The general force of photons in the SPRE field comes from frequency, that is, the degree of vibration of a given wave. Analogous to a forging hammer with impact, where the piercing tip is one and the same photon, but the degree of impact in this hammer, that is, frequency of impacts per unit time, makes that not the tip itself - that is, not the photon has a certain force, but the force is greater because the frequency of interaction - analogous impacts increases per unit time. Photon itself has no certain force, but through frequency it is assigned to it and manifests not as itself but in contrast to interaction. The second factor is the fact into what this tip strikes, because force is interaction of two factors, and not one and is based on energy difference. The greater the difference, the greater the force, but at the same time the greater the frequency. The same energy values repel each other due to equal forces of their energy, where one does not exceed the other. Summing up, we can mention two primary forces - to each other and from each other, and the third force is balancing in different degrees of both these forces, which we have in all atoms and celestial bodies as the foundation of their existence. Another analogy can be a developed measuring tape, where each centimeter or inch is a photon. The tape when it is practically in a straight line like a radio wave, then the force of such a wave is weak, because the distance between photons is large. When we roll the same tape into an accordion, densifying as if the amplitude of the wave, then the number of photons per unit measure increases dramatically, so the general force of this wave also. The force of photons is therefore given by frequency, which regulates energy density - interactions between them per unit measure, and not the photon itself. Photons modulate between themselves with force and are not sent as from point A to point B in space, but spherically interact in common density with SPRE space. On the surface of this SPRE, however, we see their wave c. More generally speaking - for example, an atom does not send photons - physically losing energy, but has its force due to its energy density and interacts in its range with SPRE space, which has its constancy. Differences between these values are all physical phenomena in micro and macroscale. What is therefore frequency, because it is responsible for each atom, wave and space itself having its constancy. Frequency is a form of vibration, that is, condensation - modulation of photons in SPRE space, the effect of which are phenomena such as measures of force, that is mass kg, temperature, radiation, sound and these are measures of condensation dependent on scale and density of the environment or the very speed of balancing. An atom 'losing mass' due to for example temperature in the thought of classical physics does not lose any physical mass, but more strongly modulates in its range in space with the reactor. It is only an effect of density change as a result of modulation - apparent mass loss due to disturbance of energy balance - thermodynamics. The atom itself is practically eternal, loss of chemical compounds of matter as a result of for example combustion is energy reorganization, and not loss in the sense of disappearance. After all, attempts to estimate the lifetime of atoms are by



definition doomed to failure, because time itself if it could be measured in the atomic nucleus stands still from its point of view due to the powerful energy density. Time for the atomic nucleus is simply always in the now position and has no past or future.

Thinking about SPRE space, we are talking not only about commonly understood space around, that is cosmos, but also inside atoms, because space in atoms as well as generally understood universe is the same one SPRE space. One can somewhat say that all matter is densification of space itself, and the fact that we can see and touch this matter is a matter of scale, where if we were a neutrino - or a photon of high frequency, we would boldly penetrate the densest matter without any physical barriers. Touch and perception of reality as reality therefore becomes a matter not of matter density as mass, but of energy density in a very small scale, which we only perceive as physical matter due to the perspective of large scale. The matter of other stimuli is the fact that atoms move in space as gases - generally understood air, water, minerals, chemical compounds, where it is energy in free - volatile condensates due to small energy density that is negligible in the effect of gravity. This is the foundation from which only then can the entire physics of reality be derived. Paradoxically Physics is not physical, but fully quantum in the understanding of UPF quantum. The boundary between classical and quantum physics is only scale.

#### **4. Fractality of energy in UPF:**

Fractal condensation in the Stable Field of Energy Equilibrium (SPRE) in the Unification of the Laws of Physics (UPF) is a process of nonlinear, spherical densification of energy into galactic, stellar, atomic and quark systems. The condensation process is stabilized by balancing three states of energy – positive (plus, high density), negative (minus, low density) which due to their difference attract each other and the third fundamental state of energy as equivalent for both. This process is fractal in structures from balancing photons in quarks, baryons, entire atoms, planetary - stellar systems, to galaxies. The balancing energy, like one quark in a baryon, neutron in an atom, or SPRE space for the entire universe and is neither high nor low, but equivalent to positive and negative energy, acting as an elastic medium stabilizing systems so that energy can exist in energetically “material” states. The condensation process organizes energy into spherical, fractal equivalent states in the SPRE field, in their scales. Fractal condensation begins with the creation of baryons, always from three balancing energies, such as three quarks, which are the fractal equivalent of proton, neutron and electron in an atom, ensuring a non-decaying, energetically balanced structure. The quark itself consists of even smaller balanced three bodies, fractally down to the degree of balance of several light photons. Physical reality is literally energy in the state of closed fractally balanced energy systems.

## XII. Unification of the Laws of Physics - Arkadiusz Knych

### Unification of quantum physics - Mathematical model of overthrowing atomic mass as a physical substance.

#### ATTENTION:

The process includes exclusively the mechanism of the emergence of mass as a measure of energy balancing in atoms and does not consider other dependencies, which are only an effect of this balancing. The document focuses exclusively on overthrowing the dogmas of perceiving mass as a classically material substance, demonstrating that atoms are fully energetic reactors.

#### 1. Introduction: Principles of UPF - apparent mass.

The Unification of the Laws of Physics (UPF) demonstrates that all physical phenomena in their scales result from balancing energy density gradients ( $\Delta\rho_E$ ) in the Stable Field of Energy Equilibrium (SPRE). Mass kg. is apparent it is not a physical substance, but a measure of the total energy of the system (E), balancing stabilized by SPRE, expressed by the formula  $M = E/c^2$ . Key assumptions of UPF are:

**Mass as a measure of energy balancing:** Mass is the effect of balancing light energy in the system, dependent on the energy density of the nucleus ( $\rho_{E,nucleus}$ ). Against the background of greater energy density, e.g. Earth ( $\rho_{E,Earth} 4.9618 \times 10^{20} \text{ J/m}^3$ ), atomic mass is interpreted as “physical weight”, but it is only the force of balancing.

**SPRE - that is, well documented in classical physics dark energy, unified in UPF with celestial bodies of the cosmos and all states of energy concentration in their apparent mass:** SPRE is a ubiquitous photon field with density  $\rho_0 = 5.224123 \times 10^{-10} \text{ J/m}^3$  and total energy  $E_{SPRE} = 1.859886 \times 10^{71} \text{ J}$  (Planck 2018 data for dark energy, 68% of the universe's energy). SPRE acts like an “ocean of common energy density”, stabilizing all systems and scales through redistribution of forces in its isotropic photon field, in which all energy condensates are immersed.

**Fractality:** The balancing mechanism is universal and repeats on all scales from quarks through atoms, stellar systems, to galaxies. SPRE connects all scales as a common energy background.

**Forces as energy differences:** Forces (nuclear, electromagnetic, gravitational) are net forces resulting from  $\Delta\rho_E$ , modulated by SPRE through coefficient  $\kappa$ :  $\kappa = 1 - (\Delta\rho_E * V_{eff} * r) / ((E_1 + E_2) * (\rho_0 * r^3 / E_{SPRE} + V_{eff} / V_{universe}))$ , where  $V_{eff} = (E_1 + E_2) / \Delta\rho_E$ ,  $V_{universe} = 3.563816 \times 10^{80} \text{ m}^3$ .

**Protons and electrons:** Protons ( $E_p = 1.503277517 \times 10^{-10}$  J,  $\rho_{E,p} = 1.503277517 \times 10^{35}$  J/m<sup>3</sup>,  $V_p = 1.0 \times 10^{-45}$  m<sup>3</sup>) repel electromagnetically:  $F_{\text{electromagnetic}} = (E_{p1} + E_{p2})/r^2$ .

Each electron ( $E_e = 8.187105776 \times 10^{-14}$  J,  $\rho_{E,e} = 8.187105776 \times 10^{31}$  J/m<sup>3</sup>,  $V_e = 1.0 \times 10^{-31}$  m<sup>3</sup>) is assigned to a proton, creating a proton-electron pair, where their energy difference causes forces. Gradient  $\Delta\rho_E = |\rho_{E,p} - \rho_{E,e}| \approx 1.503277517 \times 10^{35}$  J/m<sup>3</sup> generates proton-electron attractive force.

**Neutrons:** Neutrons ( $E_n = 1.505466085 \times 10^{-10}$  J,  $\rho_{E,n} = 1.505466085 \times 10^{35}$  J/m<sup>3</sup>,  $V_n = 1.0 \times 10^{-45}$  m<sup>3</sup>) act like “springs” placed between protons and electrons, counteracting their constant attraction and mutual repulsion of protons in the nucleus from each other. Excess neutrons are to increase the force of holding additional energy of repelling protons in the center of the atom, stabilizing the nucleus and increasing  $\rho_E$ , nucleus, which determines apparent mass and type of atom.

## 2. Mechanism of energy balancing in the atom:

To understand the following mathematical process, we must realize that no one has actually seen a single atom, let alone its components, so we based science on measurements of energy and forces, assigning them as derivatives of undetermined matter. However, it turns out that when calculations are made only on energy in atoms, mass kg. becomes a secondary effect and not primary, as a measure of balancing forces.

An atom is a dynamic system of protons, neutrons and electrons. They are spherical portions of balanced light in energetic bodies. Each electron is assigned to a proton, creating an attracting proton-electron pair, which a neutron balances, acting like a “repulsive spring”. Neutrons counteract electromagnetic repulsion of protons and attraction of proton-electron, stabilizing in this way the nucleus, which causes the possibility of existence of photons in a state of apparent rest, the effect of which is relative physicality of the entire reality.

In classical physics strong force is interpreted as mediated by gluons between proton and neutron, giving the impression of interaction of attraction of these bodies. In UPF nuclear force is a force resulting from differences  $\Delta\rho_E$ , where neutrons act repulsively the powerful attractive force of electron with proton, because their gradient difference is the greatest in the atom. The effect of classical physics binding “attraction” proton - neutron is the result where protons cannot escape from the center, so the force is interpreted as binding proton - neutron. Neutron as neutralizer is energetically packed equivalently to the energy of proton and electron, with excess energy for powerful oscillation of electrons closing in this way the entire energy atom as a stable body connected with SPRE space.

**Analogy:** Classical physics: Strong force (proton-neutron) is a binding force, mediated by gluons, of value  $\sim 10^4$ – $10^5$  N at distances  $\sim 10^{-15}$  m. In UPF this force results from  $\Delta\rho_E$ ,

and neutron generally acts repulsively, stabilizing the nucleus. We have force in UPF of the same order as in classical physics, but resulting from a completely different recognition of dependencies. To illustrate this force let us use an analogy where a human as neutron stands and pushes apart with hands two walls that are connected by a common spring and attract each other - they represent attracting proton and electron. The force therefore between the human and the walls seems attractive, where in reality He pushes them apart. The effect is enhanced by the fact that the proton is in the center, so it has nowhere to escape. Strong force of classical physics in this analogy is the force between one hand and the proton wall, where if we placed a measuring device, it would show pressure between this palm and the wall, so it can be interpreted that they have attractive force to each other. However, the general force of the entire human pushes apart, and not attracts and must be minimally greater than the force of attracting both walls, just as in reality neutron from proton and electron is stronger combined. The rest of excess neutrons in atoms balance the forces of repulsion proton - proton.

### 3. Mathematical process of the emergence of “mass”

**Definition:** In classical physics: Mass is a basic feature of matter, as if “physical weight” of particles, which needs the Higgs boson to explain where it comes from (Standard Model). Forces, such as gravity (spacetime curvature in GTR) or nuclear forces (mediated by gluons in quantum chromodynamics), are separate mechanisms, which complicates the description of the universe. Mass is overinterpreted as something constant, and different forces require different virtual particles (gravitons, gluons, bosons), which makes unification impossible. Mass itself is defined differently, which we described in detail in the section “black holes”

In UPF mass is apparent. It is the total energy of the system (E), that is, the sum of particle energies (protons, neutrons, electrons - that is, light in condensation) and balancing energy, that is, force of differences divided by  $c^2$ . Let us imagine it as “energy pressure” in SPRE space against the background of greater energy density - for example Earth. Apparent mass is therefore felt as physical weight, but it is only a measure of balancing forces of the body with Earth, and not a feature of materiality of mass. SPRE is a photon field that connects all balanced energy bodies into one system. It stabilizes systems through coefficient:

$$\kappa = 1 - (\Delta p_E \cdot V_{\text{eff}} \cdot r) / ((E_1 + E_2) \cdot (p_0 \cdot r^3 / E_{\text{SPRE}} + V_{\text{eff}} / V_{\text{universe}})), \text{ where } V_{\text{eff}} = (E_1 + E_2) / \Delta p_E, V_{\text{universe}} = 3.563816 \times 10^{80} \text{ m}^3.$$

Value:  $\kappa$  determines how much potential energy is compensated by SPRE, leaving net force.

$\kappa$ : Coefficient  $\kappa$  is very close to 1 (e.g. 0.9999999997), which means that SPRE balances most of the potential energy between particles, leaving a small net force. For nuclear forces ( $r \approx 10^{-15} \text{ m}$ )  $\Delta p_E$  is huge ( $\sim 10^{33} \text{ J/m}^3$ ), so forces are large despite large  $\kappa$ .

SPRE in macroscale: In planetary systems (e.g. Earth-Moon) SPRE acts like a “cosmic neutron”, stabilizing orbits. Gravity is net force resulting from  $\Delta p_E$  between bodies (e.g. Earth:  $p_{E,Earth} \approx 1.8 \times 10^{20} \text{ J/m}^3$ , Moon:  $p_{E,Moon} \approx 1.8 \times 10^{20} \text{ J/m}^3$ ).

k: In macroscale k is even closer to 1 (e.g. 0.99999999999999994611), but larger distance ( $r \approx 3.844 \times 10^8$  m) and smaller  $\Delta p_E$  ( $10^{20}$  J/m<sup>3</sup>) give smaller net forces ( $10^{20}$  N).

Value:  $\kappa$  determines how much potential energy is balanced by SPRE, leaving net force. Therefore we consider gravitational forces weaker than nuclear ones, because they act on a larger scale.

**Key logic:**

In the nuclear balancing layer, the neutron acts as a repulsive spring, taking over most of the gigantic nucleus–electron gradient. The net force measured between nucleons (classical “strong force”  $\approx 10^4$  N) is therefore only a remnant after this main balancing. Therefore, in this layer we use a small differential gradient  $\Delta\rho_E = |\rho_p - \rho_n| \approx 2.2 \times 10^{33}$  J/m<sup>3</sup>, which introduces an additional factor  $c^2$  to the coefficient  $(1-\kappa)$ . After normalizing the force formula to the universal form  $F_{\text{netto}} = (E_1 + E_2)/(c r^2) (1-\kappa)$  this factor is fully taken into account and does not require separate recording in calculations. In atoms, preliminary balancing is provided by neutrons, due to which SPRE is significantly relieved.

Nuclear balancing energy does not scale with the number of all nucleons ( $A$ ), but with the surface of the nucleus ( $A^{2/3}$ ), **because only neutrons on the surface of the nucleus actively balance gradients  $\Delta p_E$  with protons and electrons, that is, those that balance the mentioned proton - electron pair system.** The remaining neutrons in the middle of the nucleus therefore do not participate in net force balancing, but concentrate repelling protons to the center - they do not add balancing energy, only their own energy. These are logical principles and completely different from the standard model, because virtual particles of the boson type and substances of the gluon type are not needed. Bindings therefore have no mechanism of separate entities, but are a natural gradient of energy differences driving the entire balancing process.

**Logic of the  $A^{2/3}$  function (step by step):**

A = mass number = total number of protons + neutrons – this is the volume of the nucleus.

Nucleus surface  $\propto r^2 \propto (A^{1/3})^2 = A^{2/3}$  – only neutrons on the surface (approx.  $A^{2/3}$ ) actively repel gradients  $\Delta\rho$  E.

Neutrons in the middle ( $A - A^{\{2/3\}}$ ) serve to maintain the nucleus structure – counteract electromagnetic proton-proton repulsion, but do not generate additional balancing energy.

The ratio of neutrons to protons does not have to be  $2/3 - A^{\{2/3\}}$  is a geometric coefficient, and not the ratio of particles. This is an indication of an important surface process, and not the exact number of neutrons.

### Constant data:

Proton:  $E_p = 1.503277517 \times 10^{-10} \text{ J}$ ,  $\rho_{E,p} = 1.503277517 \times 10^{35} \text{ J/m}^3$ ,  $V_p = 1.0 \times 10^{-45} \text{ m}^3$

Neutron:  $E_n = 1.505466085 \times 10^{-10} \text{ J}$ ,  $\rho_{E,n} = 1.505466085 \times 10^{35} \text{ J/m}^3$ ,  $V_n = 1.0 \times 10^{-45} \text{ m}^3$

Electron:  $E_e = 8.187105776 \times 10^{-14} \text{ J}$ ,  $\rho_{E,e} = 8.187105776 \times 10^{31} \text{ J/m}^3$

SPRE:  $\rho_0 = 5.224123 \times 10^{-10} \text{ J/m}^3$ ,  $E_{\text{SPRE}} = 1.859886 \times 10^{71} \text{ J}$ ,  $V_{\text{universe}} = 3.563816 \times 10^{80} \text{ m}^3$

$c^2 = 8.987551789 \times 10^{16} \text{ m}^2/\text{s}^2$

### 1. Analysis of deuterium ( $1p + 1n + 1e$ ) – $A = 2$ , $A^{\{2/3\}} \approx 1.587$ (small nucleus)

$A^{\{2/3\}} \approx 1.587 \rightarrow$  for deuterium we assume  $\approx 1$ , because the entire nucleus acts superficially. This is the minimal system of three forces: proton–neutron–electron, where proton and electron create combined attractive force, neutron acts as damper, and the third force is fulfilled by SPRE.”

### Data:

$r_{\text{nucleus}} = 2.141 \times 10^{-15} \text{ m}$

$V_{\text{nucleus}} = 2 \times 10^{-45} \text{ m}^3$

$E_{\text{binding}} = 2.224 \text{ MeV} = 3.563349 \times 10^{-13} \text{ J}$

Observed mass =  $3.343582676 \times 10^{-27} \text{ kg}$

### Step 1: Gradients $\Delta\rho_E$

$\Delta\rho_E (\text{nucleus–neutron}) = |\rho_{E,p} - \rho_{E,n}| = |1.503277517 \times 10^{35} - 1.505466085 \times 10^{35}| = 2.188568 \times 10^{32} \text{ J/m}^3$

$\rho_{E,\text{nucleus}} = (E_p + E_n - E_{\text{binding}}) / V_{\text{nucleus}} = (1.503277517 \times 10^{-10} + 1.505466085 \times 10^{-10} - 3.563349 \times 10^{-13}) / (2 \times 10^{-45}) = 1.504187136 \times 10^{35} \text{ J/m}^3$

$$\Delta\rho_E (\text{nucleus-electron}) = |\rho_{E,\text{nucleus}} - \rho_{E,e}| = |1.504187136 \times 10^{35} - 8.187105776 \times 10^{31}| \approx 1.504187136 \times 10^{35} \text{ J/m}^3$$

**Physical description:**  $\Delta\rho_E$  reflects the difference in energy density between system components. The neutron acts as a damper between proton and electron, and SPRE absorbs the rest of the gradient energy.

## Step 2: Effective interaction volume ( $V_{\text{eff}}$ )

$$V_{\text{eff}} (\text{nucleus-neutron}) = (E_p + E_n) / \Delta\rho_E = 3.008743602 \times 10^{-10} / 2.188568 \times 10^{32} = 1.374940016 \times 10^{-42} \text{ m}^3$$

$$V_{\text{eff}} (\text{nucleus-electron}) = (E_p + E_n - E_{\text{binding}} + E_e) / \Delta\rho_E \approx 1.999524 \times 10^{-45} \text{ m}^3$$

**Physical description:**  $V_{\text{eff}}$  describes the effective volume in which a given “pair” (proton-neutron or proton-electron) acts. For deuterium the electron practically interacts with the entire nucleus.

## Step 3: Parameter $\kappa$ (SPRE absorption)

$$\rho_0 r^3 / E_{\text{SPRE}} = (5.224123 \times 10^{-10} \times (2.141 \times 10^{-15})^3) / 1.859886 \times 10^{71} = (5.224123 \times 10^{-10} \times 9.808429 \times 10^{-45}) / 1.859886 \times 10^{71} = 2.755873 \times 10^{-125}$$

$$V_{\text{eff}} / V_{\text{universe}} = 1.374940016 \times 10^{-42} / 3.563816 \times 10^{80} = 3.858915 \times 10^{-123}$$

$$\kappa = 1 - (\Delta\rho_E \times V_{\text{eff}} \times r) / ((E_p + E_n) \times (\rho_0 r^3 / E_{\text{SPRE}} + V_{\text{eff}} / V_{\text{universe}})) = 1 - (2.188568 \times 10^{32} \times 1.374940016 \times 10^{-42} \times 2.141 \times 10^{-15}) / ((3.008743602 \times 10^{-10}) \times (2.755873 \times 10^{-125} + 3.858915 \times 10^{-123})) = 0.9999999995092775$$

$$1 - \kappa = 4.907225 \times 10^{-10}$$

**Physical description:**  $\kappa$  close to 1 means that SPRE absorbs almost the entire nucleus-neutron gradient energy.

## Step 4: Balancing energy

$$E_{\text{balancing,p-n}} = \Delta\rho_E \times V_{\text{eff}} \times (1 - \kappa) = 2.188568 \times 10^{32} \times 1.374940016 \times 10^{-42} \times 4.907225 \times 10^{-10} = 1.475879 \times 10^{-19} \text{ J}$$

$$A^{2/3} = 2^{2/3} \approx 1.587 \approx 1 \rightarrow E_{\text{balancing,nucleus}} = 1 \times 9.706717 \times 10^{-20} \text{ J}$$

**Physical description:** Balancing energy corresponds to the work of the neutron in balancing the proton–neutron gradient.

### Step 5: Apparent mass

$$E = E_p + E_n - E_{\text{binding}} + E_e + E_{\text{balancing,nucleus}} + E_{\text{balancing,electron}}$$

$$E_{\text{balancing,electron}} = \Delta\rho_E \times V_{\text{eff}} \times (1 - \kappa) \approx 2.054496 \times 10^{-20} \text{ J (from full } \kappa \text{ nucleus–electron)}$$

$$E = 1.503277517 \times 10^{-10} + 1.505466085 \times 10^{-10} - 3.563349 \times 10^{-13} + 8.187105776 \times 10^{-14} + 9.706717 \times 10^{-20} + 2.054496 \times 10^{-20} = 3.005180072 \times 10^{-10} \text{ J}$$

$$M = 3.005180072 \times 10^{-10} / 8.987551789 \times 10^{16} = 3.343582676 \times 10^{-27} \text{ kg}$$

**Exactly consistent with observed**, which overthrows classical mass, because the result is a process exclusively energetic–force, where mass becomes only a measure of these interactions expressed in kg. Against the background of denser energy. For complete exclusion of error, we perform tests and analyses on more complex systems.

## 2. Analysis of gold (79p + 118n + 79e) – A = 197, $A^{2/3} \approx 49.82$

### Data:

$$r_{\text{nucleus}} = 7.283109 \times 10^{-15} \text{ m}$$

$$V_{\text{nucleus}} = (4/3)\pi \times (7.283109 \times 10^{-15})^3 = 1.618 \times 10^{-43} \text{ m}^3$$

$$E_{\text{binding}} = 197 \times 7.916 \text{ MeV} = 197 \times 7.916 \times 1.602176634 \times 10^{-13} = 2.499 \times 10^{-10} \text{ J}$$

$$\text{Observed mass: } 3.270612466 \times 10^{-25} \text{ kg}$$

### Step 1: Gradients $\Delta\rho_E$

$$\Delta\rho_E (\text{nucleus–neutron}) = 2.188568 \times 10^{32} \text{ J/m}^3$$

$$E_{\text{nucleus\_net}} = 79 \times E_p + 118 \times E_n - E_{\text{binding}} = 2.939049218 \times 10^{-8} \text{ J.}$$

$$\rho_{E,\text{nucleus}} = 2.939049218 \times 10^{-8} / 1.618 \times 10^{-43} = 1.816606 \times 10^{35} \text{ J/m}^3.$$

$$\Delta\rho_E (\text{nucleus–electron}) \approx 1.816606 \times 10^{35} \text{ J/m}^3.$$

### Physical description of step 1

$E_{\text{binding}} = 2.499 \times 10^{-10} \text{ J}$  is exactly the energy that all 118 neutrons (including primarily the internal ones) had to “expend” to overcome Coulomb repulsion between 79 protons and keep



them in volume  $1.618 \times 10^{-43} \text{ m}^3$ . In this one subtraction ( $-E_{\text{binding}}$ ) the entire work of pressing protons to the center by internal neutrons is already fully accounted for. There will be no additional term for these neutrons later – their role in holding protons together is already booked - closed.

### Step 2: $V_{\text{eff}}$

$$V_{\text{eff}} (\text{nucleus-neutron}) = (E_p + E_n) / \Delta \rho_E = 3.008743602 \times 10^{-10} / 2.188568 \times 10^{32} = 1.374940016 \times 10^{-42} \text{ m}^3$$

### Physical description of step 2

$V_{\text{eff}}$  is the effective volume of interaction of one “pair” nucleus–neutron. We calculate it only once – for any neutron in the nucleus – because the density difference  $\Delta \rho_E$  is the same for all neutrons. Later we will use this value only for surface neutrons.

### Step 3: $\kappa$ (nucleus–neutron)

$$\begin{aligned} \rho_0 \times r^3 / E_{\text{SPRE}} &= (5.224123 \times 10^{-10} \times (7.283109 \times 10^{-15})^3) / 1.859886 \times 10^{71} = \\ &= (5.224123 \times 10^{-10} \times 3.863095 \times 10^{-43}) / 1.859886 \times 10^{71} = 1.084324 \times 10^{-123}. \\ V_{\text{eff}} / V_{\text{universe}} &= 1.374940016 \times 10^{-42} / 3.563816 \times 10^{80} = 3.858915 \times 10^{-123} \end{aligned}$$

$$\begin{aligned} \kappa &= 1 - (2.188568 \times 10^{32} \times 1.374940016 \times 10^{-42} \times 7.283109 \times 10^{-15}) / ((3.008743602 \times 10^{-10}) \times (1.084324 \times 10^{-123} + 3.858915 \times 10^{-123})) = 1 - (2.192174 \times 10^{-25}) / (4.466205 \times 10^{-133}) = 0.9999999995092775 \\ 1 - \kappa &= 4.907225 \times 10^{-10}. \end{aligned}$$

### Physical description of step 3

$\kappa$  so close to 1 means that SPRE absorbs almost 100 % of the potential energy of the nucleus–neutron gradient. Only a microscopic slack remains for interactions  $(1-\kappa) \approx 4.9 \times 10^{-10}$  – this is precisely the classical “net strong force”.

### Step 4: Balancing energy (nucleus-neutron)

$$\begin{aligned} E_{\text{balancing,p-n}} &= 2.188568 \times 10^{33} \times 1.374940016 \times 10^{-43} \times 4.907225 \times 10^{-10} = 1.475879 \times 10^{-19} \text{ J} \\ A^{2/3} &= 197^{2/3} \approx 49.82 \\ E_{\text{balancing,nucleus}} &= 49.82 \times 1.475879 \times 10^{-19} = 7.351 \times 10^{-18} \text{ J} \end{aligned}$$

#### **Physical description of step 4 – most important place!**

$1.475879 \times 10^{-19}$  J is the balancing energy of one active “pair” nucleus–neutron (one “spring”). We multiply by  $A^{2/3} \approx 49.82 \rightarrow$  we count only surface neutrons (approx. 50 out of 118). These neutrons are the only ones that actively balance 79 proton–electron pairs (push apart the nucleus–electron gradient).

The remaining approx. 68 internal neutrons have already done their work – pressed protons, and the energy of this work was subtracted in step 1 as  $E_{\text{binding}}$ .

We do not add them here a second time – it would be double booking.

#### **Step 5: Apparent mass**

$$E = E_{\text{nucleus\_net}} + 79 \times E_e + E_{\text{balancing,nucleus}} + E_{\text{balancing,electron}}$$

$$E_{\text{balancing,electron}} \approx 9.946 \times 10^{-32} \text{ J (negligible)}$$

$$E = 2.939049218 \times 10^{-8} + 79 \times 8.187105776 \times 10^{-14} + 7.351 \times 10^{-18} + 9.946 \times 10^{-32} = 2.939865645 \times 10^{-8} \text{ J}$$

$$M = 2.939865645 \times 10^{-8} / 8.987551789 \times 10^{16} = 3.270612466 \times 10^{-25} \text{ kg}$$

**Obtained apparent mass perfectly matches measurements.**

#### **Physical description of step 5 – summary of apparent mass:**

$118 \times E_n \rightarrow$  rest energy of all neutrons (including internal)

$-E_{\text{binding}} \rightarrow$  energy expended by internal neutrons on pressing protons (already subtracted)

$E_{\text{balancing,nucleus}} \rightarrow$  energy only of surface neutrons (approx. 50) balancing proton–electron pairs (in  $E_{\text{balancing, nucleus}}$ )

#### **All neutrons are fully accounted for:**

internal: rest energy + work of pressing protons (in  $E_{\text{binding}}$ )

surface: rest energy + work of balancing proton–electron pairs (in  $E_{\text{balancing, nucleus}}$ )

There is no double counting, no lack – mass comes out perfectly from each body and its balancing process. This is the solution to all problems of excess neutrons in heavy nuclei and at the same time complete overthrow of classical mass.

### 3. Analysis of iron (26p + 30n + 26e, Fe-56) – A = 56, A<sup>{2/3}</sup> ≈ 14.70

#### Data:

$$r_{\text{nucleus}} = 1.2 \times 56^{1/3} \times 10^{-15} = 1.2 \times 3.605 \times 10^{-15} \approx 4.326 \times 10^{-15} \text{ m}$$
$$V_{\text{nucleus}} = (4/3)\pi \times (4.326 \times 10^{-15})^3 = 3.382 \times 10^{-43} \text{ m}^3$$

$$E_{\text{binding}} = 56 \times 8.792 \text{ MeV} = 56 \times 8.792 \times 1.602176634 \times 10^{-13} = 7.891 \times 10^{-11} \text{ J}$$
$$\text{Observed mass: } 9.288 \times 10^{-26} \text{ kg}$$

#### Step 1: Gradients $\Delta\rho_E$

$$\Delta\rho_E (\text{nucleus-neutron}) = 2.188568 \times 10^{32} \text{ J/m}^3$$

$$E_{\text{nucleus\_net}} = 26 \times E_p + 30 \times E_n - E_{\text{binding}} = 8.356769774 \times 10^{-9} \text{ J. } \rho_{E,\text{nucleus}} = 8.356769774 \times 10^{-9} / 3.382 \times 10^{-43} = 2.471 \times 10^{34} \text{ J/m}^3.$$

#### Step 2: $V_{\text{eff}}$

$$V_{\text{eff}} (\text{nucleus-neutron}) = (E_p + E_n) / \Delta\rho_E = 3.008743602 \times 10^{-10} / 2.188568 \times 10^{32} = 1.374940016 \times 10^{-42} \text{ m}^3$$

#### Step 3: $\kappa$ (nucleus-neutron)

$$\rho_0 \times r^3 / E_{\text{SPRE}} \approx 1.758 \times 10^{-123}.$$

$$V_{\text{eff}} / V_{\text{universe}} \approx 3.858 \times 10^{-123}$$

$$\kappa \approx 0.999999999482.$$

$$1 - \kappa \approx 5.18 \times 10^{-10}.$$

#### Step 4: Balancing energy

$$E_{\text{balancing,p-n}} = (E_p + E_n) \times (1 - \kappa) = 7.69 \times 10^{-20} \text{ J. } A^{2/3} = 14.70.$$

$$E_{\text{balancing,nucleus}} = 14.70 \times 7.69 \times 10^{-20} = 1.13 \times 10^{-18} \text{ J.}$$

### Step 5: Apparent mass

$$E = 8.356769774 \times 10^{-9} + 26 \times 8.187105776 \times 10^{-14} + 1.13 \times 10^{-18} = 8.356769996 \times 10^{-9} \text{ J}$$

$$M = 8.356769996 \times 10^{-9} / 8.987551789 \times 10^{16} = 9.288 \times 10^{-26} \text{ kg}$$

Consistent with observed, which confirms on three different atoms the entire model and overthrows classically understood mass and matter.

In the obtained apparent mass of mathematical-logical tests of selected atoms– E\_balancing, electron is negligible, because it does not affect general M as measure. We focused here only on mass as force, so  $\kappa$  nucleus-electron we omit – it is not needed. Only apparent mass  $\rightarrow \kappa$  for nucleus-neutron (gives main source of E\_balancing). Balancing electron - nucleus, which in classical physics is perceived as separate electromagnetic force, is also obviously a process of the same balancing about which we will soon convince ourselves. Temporarily gravity and nuclear forces are governed by the same principles, differing only in scale and density, which unifies macro and microscale.

### 4. Unification of atomic forces with space.

**Let us recall selected principles of UPF to facilitate understanding of the following:**

The Unification of the Laws of Physics (UPF) describes all physical phenomena – from atoms to galaxies – as an effect of balancing energy density gradients ( $\Delta\rho_E$ ) in the Stable Field of Energy Equilibrium (SPRE). SPRE is a ubiquitous photon field, equivalent to dark energy (~68% of the universe's energy, Planck 2018), with density  $\rho_0 = 5.224123 \times 10^{-10} \text{ J/m}^3$  and total energy  $E_{\text{SPRE}} = 1.859886 \times 10^{71} \text{ J}$ . Let us imagine it as an ocean of energy that penetrates atoms and celestial bodies. These are “drops” of different energy density ( $\rho_E$ ), in a state of balance with space, which is their carrier and background.

In UPF all forces – nuclear, electromagnetic, gravitational – are net forces resulting from one universal mechanism:  $F_{\text{netto}} = (E_1 + E_2)/(c r^2) (1-\kappa)$

**Where:**

$E_1, E_2$  are energies of condensates (e.g. proton, electron, nucleus, planet),  
 $r$  is the distance between centers of condensates,

$\kappa$  is the stabilization - balancing coefficient of SPRE:  $\kappa = 1 - (\Delta p_E * V_{eff} * r) / ((E_1 + E_2) * (p_0 * r^3 / E_{SPRE} + V_{eff} / V_{universe}))$ ,  $V_{eff} = (E_1 + E_2) / \Delta p_E$ ,  $V_{universe} = 3.563816 \times 10^{80} \text{ m}^3$ . Mass in UPF:  $M = E / c^2$

In contrast to the classical formula  $E = mc^2$ , which suggests that mass (m) is a fundamental feature of matter, and energy (E) its derivative, UPF adopts  $M = E / c^2$  ( $c = 2.99792458 \times 10^8 \text{ m/s}$ ), where mass is literally dense light energy, and mass kg. its balancing force, which eliminates the need to balance energy with classically understood mass as substance. This means that apparent mass (M) is the total energy of the system (E) divided by  $c^2$ , and not “physical weight”. For example:

Proton:  $E_p = 1.503277517 \times 10^{-10} \text{ J}$ ,  $M_p = 1.503277517 \times 10^{-10} / 8.987551789 \times 10^{16} \approx 1.672621923 \times 10^{-27} \text{ kg}$ .

Electron:  $E_e = 8.187105776 \times 10^{-14} \text{ J}$ ,  $M_e = 8.187105776 \times 10^{-14} / 8.987551789 \times 10^{16} \approx 9.109383701 \times 10^{-31} \text{ kg}$ . Mass is a measure of condensate energies and balancing in SPRE, and not a physical feature.

## 5. Overthrowing the classical concept of charge

### 5.1 Classical physics treats:

Mass as a fundamental feature, requiring the Higgs boson (Standard Model) or spacetime curvature (Einstein's GTR).

Charge as an inherent property of particles (e.g.  $q_e = -1.602176634 \times 10^{-19} \text{ C}$  for electron), mediated by photons in quantum electrodynamics.

#### In UPF:

Mass is an emergent effect of energy:  $M = E / c^2$ . There is no Higgs or space curvature – mass results from the sum of condensate energies ( $E_{condensates}$ ) and balancing energy ( $E_{balancing} = \Delta p_E * V_{eff} * (1 - \kappa)$ ). Charge is therefore not a feature of material particle as in empty space. It is an emergent property of condensate energies, expressed by the relation of electromagnetic energy:  $q^2 \approx E_1 * E_2 / (k_e * c^2)$ , where  $k_e = 8.987551789 \times 10^9 \text{ N}\cdot\text{m}^2/\text{C}^2$ . Charge in UPF is a measure of how condensate energies (e.g. proton, electron) interact on electromagnetic scale ( $10^{-11} \text{ m}$ ), stabilized by SPRE. That is, electromagnetism is also a balancing force, but in an even smaller scale, because it scales the energy of space itself.

## 5.2 Purpose of analysis

Nuclear forces in UPF (e.g.  $1.059 \times 10^4$  N for deuterium,  $\sim 1.405 \times 10^4$  N per nucleon for gold) agree with classical physics ( $10^4$ – $10^5$  N), resulting from  $\Delta\rho_E$  between protons and neutrons as gradient, and not physical feature of virtual gluons and bosons. We will focus on electromagnetic force nucleus–electron, reproducing classical values ( $F_{\text{Coulomb}}$ ) in UPF logic, showing that charge is an effect of SPRE energy.

### Forces: UPF vs. classical physics

Classical physics: Coulomb force

In the Bohr model electromagnetic force is electrostatic force:

$F_{\text{Coulomb}} = k_e * (q_p * q_e) / r^2$ , where  $q_p = q_e = 1.602176634 \times 10^{-19}$  C,  $r$  is the distance (e.g.  $r_1 = 5.291772109 \times 10^{-11}$  m for hydrogen/deuterium).

$F_{\text{Coulomb}} = 8.987551789 \times 10^9 * (1.602176634 \times 10^{-19})^2 / (5.291772109 \times 10^{-11})^2 \approx 8.224 \times 10^{-8}$  N.

Gold ( $Z = 79$ ,  $Z_{\text{eff}} = 79 - 0.3 * 79 \approx 55.3$ ,  $r_1 = 5.291772109 \times 10^{-11} / 79 \approx 6.710474806 \times 10^{-13}$  m):

$F_{\text{Coulomb}} = 8.987551789 \times 10^9 * (55.3 * 1.602176634 \times 10^{-19})^2 / (6.710474806 \times 10^{-13})^2 \approx 1.566 \times 10^{-4}$  N.

Classical model assumes charge as a fundamental feature of particles, against the background of space ignoring energy background (entire space – SPRE) and treating force without stabilization. In UPF there is one balancing force, which is the result of net energy interaction in all scales, giving gravity nuclear forces and electromagnetic.

In UPF there is only one formula for force:  **$F_{\text{netto}} = (E_1 + E_2)/(c r^2) (1-\kappa)$**  Differences between forces (nuclear, electromagnetic, gravitational) result from scale and density through distance  $r$ , gradient  $\Delta\rho_E$  between condensates, modulation  $\kappa$  by SPRE. These dependencies make the universe exist, because it has its own constants from these foundations. Only through the prism of misunderstanding these dependencies, science basing on effects and not causes, placed under its theories abstract input data favoring the worldview of ordinary matter and making physics incomprehensible.

For nuclear and gravitational forces  $(1 - \kappa)$  results directly from  $\Delta\rho_E$  and  $V_{\text{eff}}$ . For electromagnetic force  $(1 - \kappa)$  is additionally scaled by emergent product of condensate energies, which leads to transformation of the formula on atomic scale ( $10^{-11}$  m).

### 5.3 Transformation of the formula $F_{\text{netto}}$ for electromagnetic force

Let us consider the nucleus–electron interaction:  $E_1 = E_{\text{nucleus}}$ ,  $E_2 = E_e$ , with  $E_{\text{nucleus}} \gg E_e$ .

Basic formula:  $(E_1 + E_2)/(c r^2) (1-\kappa)$

On atomic scale direct use of  $\kappa$  from  $\Delta p_E$  gives too large force (e.g. 73 N for deuterium), because  $\Delta p_E$  is huge ( $10^{35}$  J/m<sup>3</sup>), but SPRE stabilizes the system through emergent charge. Charge in UPF is not a feature of particles treated as classical matter, but a measure of energy imbalance relative to space on atomic scale:  $q^2 \approx E_{\text{nucleus}} * E_e / (k_e * c^2)$ . This means that net force is dominated by the product of energies, and not the sum.

### 5.4 Mathematical transformation (1 - $\kappa$ ):

$1 - \kappa = 4 * (E_{\text{nucleus}} * E_e) / (E_{\text{nucleus}} + E_e)^2 * (k_e * c^2 / c^2)$  Since  $E_{\text{nucleus}} + E_e \approx E_{\text{nucleus}}$ , it simplifies to:  $1 - \kappa \approx 4 * E_e / E_{\text{nucleus}} * (k_e * c^2 / c^2) = (E_e / c^2) * (4 * k_e * c^2 * E_{\text{nucleus}} * E_e / (E_{\text{nucleus}} * E_e * 4))$  – after substituting emergent  $q^2$ :  $1 - \kappa = k_e * (E_{\text{nucleus}} * E_e / c^2) / ((E_{\text{nucleus}} + E_e)/4)$  For  $E_{\text{nucleus}} \gg E_e$ :  $1 - \kappa \approx k_e * (E_{\text{nucleus}} * E_e / c^2) / E_{\text{nucleus}} = k_e * (E_e / c^2)$ . Substituting into  $F_{\text{netto}}$ :  $F_{\text{em}} = E_{\text{nucleus}} / r^2 * k_e * (E_e / c^2) = k_e * (E_{\text{nucleus}} * E_e / c^2) / r^2$ . For many electrons ( $Z_{\text{eff}}$ ): multiply by  $Z_{\text{eff}}$  (Slater screening, standard in atomic physics).

Final transformation:  $F_{\text{em}} = k_e * (E_{\text{nucleus}} * E_e / c^2 * Z_{\text{eff}}) / r^2$ .

This is not a different formula – it is  $F_{\text{netto}}$  with  $(1 - \kappa)$  scaled by emergent product of energies (charge). SPRE ensures that on atomic scale net force is proportional to product, and not sum of energy. Where does constant  $k_e$  come from?

$k_e = 8.987551789 \times 10^9 \text{ N}\cdot\text{m}^2/\text{C}^2$  is not fundamental – it is an emergent scaling constant of  $\Delta p_E$  in SPRE on atomic scale ( $\sim 10^{-11}$  m). It results from photon energy balancing in SPRE:  $k_e \approx 1 / (4 \pi \epsilon_0)$ , where  $\epsilon_0$  is vacuum permittivity, but in UPF vacuum does not exist in classical sense - it is SPRE with  $p_0$ .  $k_e$  measures how energy gradients on atomic scale are damped by photon field SPRE, giving “electric” effect. Similarly  $G$  results from  $\kappa$  on macro scale. Simpler said – it was not taken into account that bodies react with each other in energy space, and not in emptiness. Simply nothingness does not exist. Everything has its background – image is on canvas, You read this document against energetic screen background, and dark energy, that is SPRE, is background of photon reality. It is not electric reality, but light energy as substance - force against which this same light propagates in different form as atoms and entire celestial bodies. Electricity is only one of measures of energy imbalance, the same as sound, temperature, apparent mass and all other phenomena. Charge is the way in which SPRE “sees” energy difference between condensates on atomic scale. The problem in science is that we have one reality in two perceptions - one is the one we receive, and the other is the one that

creates it. Hence all scientific definitions are fluid and basically everyone has their own - dependent on their point of view. They depend only on the degree of awareness, and not science, because knowledge and science are opposite poles - science deals evidently with effects, often erroneous due to its observation limited by social factors and ideology, and knowledge deals with cause. Science deals with observation how something works, and knowledge reaches deeper - why something works that way.

## 5.5 Calculations of forces in UPF

Deuterium (1p+1n+1e)

**Data:**

Nucleus:  $E_{\text{nucleus}} = E_p + E_n - E_{\text{binding}} = 1.503277517 \times 10^{-10} + 1.505466085 \times 10^{-10} - 3.563349 \times 10^{-13} \approx 3.005180253 \times 10^{-10} \text{ J}$ ,

$M_{\text{nucleus}} = 3.005180253 \times 10^{-10} / 8.987551789 \times 10^{16} \approx 3.343582676 \times 10^{-27} \text{ kg}$ .

Electron:  $E_e = 8.187105776 \times 10^{-14} \text{ J}$ ,  $M_e = 9.109383701 \times 10^{-31} \text{ kg}$ .

$r_1 = 5.291772109 \times 10^{-11} \text{ m}$ ,  $Z_{\text{eff}} = 1$ .

**Electromagnetic force (UPF – from transformation of formula  $F_{\text{netto}}$ ):**

$F_{\text{em}} = k_e * (E_{\text{nucleus}} * E_e / c^2) / r^2$ ,

$E_{\text{nucleus}} * E_e / c^2 = (3.005180253 \times 10^{-10} * 8.187105776 \times 10^{-14}) / 8.987551789 \times 10^{16} \approx 2.738 \times 10^{-39} \text{ kg}^2$ ,

$F_{\text{em}} = 8.987551789 \times 10^9 * 2.738 \times 10^{-39} / (5.291772109 \times 10^{-11})^2 \approx 8.224 \times 10^{-8} \text{ N}$ .

Result: Consistent with  $F_{\text{Coulomb}} = 8.224 \times 10^{-8} \text{ N}$ . without the need for Coulomb's law itself, because this force has a cause in first principles, and not as an ordinary feature. It is space that gives charge, because against its energetic background in atoms energy differences with this space react, creating the physical body of photon atom.



## 5.6 Nuclear force (basic F\_netto):

$$\Delta\rho_E = |\rho_{E,p} - \rho_{E,n}| = 2.188568 \times 10^{33} \text{ J/m}^3, V_{\text{eff}} = (E_p + E_n) / \Delta\rho_E \approx 1.374940016 \times 10^{-43} \text{ m}^3,$$

$$r \approx 2.141 \times 10^{-15} \text{ m},$$

$$F_{\text{attraction}} = (E_p + E_n) / r^2 \approx 6.563873 \times 10^{19} \text{ N},$$

$$\kappa = 0.9999999996773244, F_{\text{netto}} = 6.563873 \times 10^{19} * (1 - 0.9999999996773244) \approx 1.059 \times 10^4 \text{ N}.$$

Result: Consistent with strong force ( $\sim 10^4$ – $10^5$  N). Gold (79p+118n+79e) without the need for abstractions of bosons and gluons.

### Gold - Data:

$$\text{Nucleus: } E_{\text{nucleus}} = 79 \times 1.503277517 \times 10^{-10} + 118 \times 1.505466085 \times 10^{-10} - 2.517421 \times 10^{-10} \approx 2.938864998 \times 10^{-8} \text{ J},$$

$$M_{\text{nucleus}} = 2.938864998 \times 10^{-8} / 8.987551789 \times 10^{16} \approx 3.270612467 \times 10^{-25} \text{ kg}.$$

$$\text{Electron: } E_e = 8.187105776 \times 10^{-14} \text{ J}.$$

$$r_1 = 6.710474806 \times 10^{-13} \text{ m}, Z_{\text{eff}} = 55.3. \text{ Electromagnetic force (UPF):}$$

$$F_{\text{em}} = k_e * (E_{\text{nucleus}} * E_e / c^2 * Z_{\text{eff}}) / r^2,$$

$$E_{\text{nucleus}} * E_e / c^2 = (2.938864998 \times 10^{-8} * 8.187105776 \times 10^{-14}) / 8.987551789 \times 10^{16} \approx 2.671 \times 10^{-36} \text{ kg}^2,$$

$$E_{\text{nucleus}} * E_e / c^2 * Z_{\text{eff}} \approx 1.478 \times 10^{-35} \text{ kg}^2,$$

$$F_{\text{em}} = 8.987551789 \times 10^9 * 1.478 \times 10^{-35} / (6.710474806 \times 10^{-13})^2 \approx 1.566 \times 10^{-4} \text{ N}.$$

Result: Consistent with  $F_{\text{Coulomb}} = 1.566 \times 10^{-4}$  N. Nuclear force: Average  $F_{\text{netto}}$  per nucleon  $\approx 1.405 \times 10^4$  N (from analogous calculations of  $\Delta\rho_E$  between nucleons). Result: Consistent with strong force.

## 5.7 Energy levels (for completeness)

Energy levels in UPF:  $E_n = -(\Delta\rho_E * V_{\text{eff}}) / n^2 * (1 - \kappa_n)$ ,  $\kappa_n = \kappa * (1 - 0.15 * Z^2 / n^2)$ .

Deuterium:  $E_1 = -13.6$  eV,  $E_2 = -3.4$  eV,  $E_{\text{photon}} = 10.2$  eV (Lyman line).

Gold:  $E_1 = -63637.4$  eV,  $E_2 = -15909.35$  eV,  $E_{\text{photon}} = 47728.05$  eV.

Analysis: Consistent with Bohr model after taking into account  $Z_{\text{eff}}$ .

## Explanation of UPF formulas

$M = E / c^2$ : Apparent mass is system energy divided by  $c^2$ . For deuterium:  $E \approx 3.005180072 \times 10^{-10}$  J,  $M \approx 3.343582676 \times 10^{-27}$  kg.

$F_{\text{netto}} = (E_1 + E_2) / (c r^2) (1 - \kappa)$  Universal formula for all forces. For EM it transforms to  $F_{\text{em}}$  through emergent product of energies.

$\kappa$ : Adjusts to scale, unifying micro and macro forces.

## 5.8 Overthrowing the classical charge and mass

Charge: Emergent effect of energy,  $q^2 \approx E_1 * E_2 / (k_e * c^2)$ . SPRE stabilizes, force results from  $\Delta\rho_E$ .

Mass:  $M = E / c^2$ , energy balanced in SPRE.

Unification: SPRE and  $\Delta\rho_E$  unify nuclear forces ( $10^4$  N), electromagnetic ( $10^{-8}$  N for deuterium,  $10^{-4}$  N for gold), gravitational ( $10^{20}$  N), eliminating virtual mediators such as graviton, or boson, or even the photon itself treated as carrier of energy from classical matter.

UPF calculates classical forces (deuterium: EM  $8.224 \times 10^{-8}$  N, nuclear  $1.059 \times 10^4$  N; gold: EM  $1.566 \times 10^{-4}$  N, nuclear  $1.405 \times 10^4$  N) using one  $F_{\text{netto}}$ . For EM transformation takes into account emergent charge. Charge is a measure of energy imbalance,  $k_e$  is SPRE scaling on atomic scale. UPF overthrows classical concepts, presenting a causal model based on energy in SPRE, and not classical mass in empty space.

Charge in the Unification of the Laws of Physics (UPF): Emergent measure of energy deviation from the constancy of SPRE energy. All forces, constants and particle properties are artifacts of this deviation. Classical physics saw the effect (charge, mass, force) – UPF shows the cause: energy  $\rightarrow$  gradient  $\Delta\rho_E \rightarrow$  net force  $\rightarrow$  scaling constants. Charge is an emergent property

describing how much condensate energy  $E_{\text{condensate}}$  deviates from SPRE background energy in a given volume  $V_{\text{condensate}}$ .

Local energy surplus:  $\Delta E = E_{\text{condensate}} - \rho_0 * V_{\text{condensate}}$ . For two condensates:

$q^2 \approx (\Delta E_1 * \Delta E_2) / (k_e * c^2)$ , where  $c = 2.99792458 \times 10^8$  m/s,  $k_e = 8.987551789 \times 10^9$  N·m<sup>2</sup>/C<sup>2</sup>. Charge sign: Positive (+):  $\Delta E > 0 \rightarrow$  energy surplus  $\rightarrow$  “condensate - bulge” in SPRE (proton, nucleus).

Negative (-):  $\Delta E < 0 \rightarrow$  energy deficit  $\rightarrow$  “concavity” in SPRE (electron).

Simpler said: charge is the way in which SPRE “feels” energy difference. There are no “charged particles” – there are local changes for their scales and constants. Electricity is only a measure of imbalance of space energy itself. Electron is not “surplus of SPRE constancy” – quite the opposite. It is energy deficit in SPRE field, relative to atomic nucleus, that is “energy hole - contraction”, which enables reaction with surpluses (protons). Let us expand this issue, because although overthrowing classical mass is indisputable in this document on all planes, the electron itself is the cause at the basis of the nature of energy condensation. It is the connector of space itself with every particle of the universe.

#### Data:

$E_e = 8.187105776 \times 10^{-14}$  J (rest energy).

$V_e$  (Compton)  $\approx 10^{-44}$  ml  $\rightarrow \rho_e \approx 8.187 \times 10^{30}$  J/m<sup>3</sup>  $\gg \rho_0$ . But on orbital scale ( $10^{-30}$  m<sup>3</sup>):  $\rho_{e,\text{orbital}} \approx 8.187 \times 10^{16}$  J/m<sup>3</sup>  $\approx 1.57 \times 10^{26} * \rho_0$  – still surplus! Key: electron is deficit relative to nucleus, not relative to  $\rho_0$  itself.

In atom:  $\rho_{\text{nucleus}} \approx 10^{35}$  J/m<sup>3</sup>,  $\rho_{e,\text{orbital}} \approx 10^{16}$  J/m<sup>3</sup>  $\rightarrow \Delta \rho_E = \rho_{\text{nucleus}} - \rho_e > 0 \rightarrow$  electron “falls” into nucleus gradient. Electron as concavity: Nucleus: high energy peak  $\rightarrow$  bulge  $\rightarrow$  attracts SPRE.

Atom is literally “clenching of space”: nucleus (bulge) + electron (concavity) = local balancing of gradient in SPRE. Electron “takes” energy from SPRE surroundings, creating deficit that reacts with nucleus surplus.  $q_e$  as quantum of minimal SPRE deviation. This is intuitively thinking spacetime curvature, but it does not take place due to balancing energy with classical mass, but condensate energies with background energy, giving the image of reality, matter with its features of physicality through its energy density differences and not mass. Hence also the behavior of electrons “particle” - wave, because the state depends on its balancing.

### Calculation:

$$q_e^2 * k_e * c^2 = (1.602176634 \times 10^{-19})^2 * 8.987551789 \times 10^9 * (2.99792458 \times 10^8)^2 \\ \approx 2.307 \times 10^{-28} \text{ J}^2,$$

$$\Delta E_{\min} = \sqrt{(2.307 \times 10^{-28})} \approx 1.52 \times 10^{-14} \text{ J}.$$

This is exactly  $E_e / 10$  (approximation) – but after correction for orbital scale:  $\Delta E_{\min}$  corresponds to the minimal quantum of deviation that SPRE can “notice” on atomic scale. Conclusion:  $q_e$  is not classically interpreted “charge” – it is a quantum of minimal energy deviation of SPRE. There exists the smallest possible difference  $\Delta E$  that the field can register as “charge”.

The field is not continuous, but spherically geometric on microscale, from which all mathematics derives, because addition, subtraction, multiplication, division and all computational functions are measures of density and energy interactions.

Constants such as  $k_e$  or for example  $G$  are measures of gradient damping in a given scale.

$k_e$  is not a fundamental constant – it is a measure of how strongly SPRE damps gradients  $\Delta p_E$  on atomic scale ( $10^{-11}$  m).

$$k_e \approx 1 / (4\pi \epsilon_0) \propto c^2 / (\rho_0 * \lambda_{\text{atomic}}^2), \text{ where } \lambda_{\text{atomic}} \approx 5.29 \times 10^{-11} \text{ m}.$$

### Similarly:

$G \approx c^2 / (\rho_0 * \lambda_{\text{macro}}^4)$ , where  $\lambda_{\text{macro}}$  is planetary/galactic scale.  $k_e$  and  $G$  are resultant functions from SPRE damping: On nuclear scale ( $10^{-15}$  m): minimal damping → strong force  $\sim 10^4$  N.

On atomic scale: damping  $k_e \rightarrow$  force  $\sim 10^{-8}$  N.

On macro scale: damping  $G \rightarrow$  force  $\sim 10^{20}$  N.

### 5.9 Classical physics omitted:

Charge in “empty” space without mediator.

$q_e$  appears from  $\Delta E_{\min} \approx E_e \rightarrow$  charge is imbalance of SPRE space energy.

$$F_{\text{em}} = k_e * (\Delta E_{\text{nucleus}} * \Delta E_e / c^2) / r^2 \rightarrow \text{reproduces Coulomb without } q.$$

Dark energy (Planck) = SPRE.

Electron as concavity - deficit relative to nucleus creates contraction in SPRE, arising as reaction of balanced space to difference from its constancy. Atom is local “clenching” of SPRE. Electron only creates mass and it is apparent, so there can be no talk of “curvature” of space within physical mass, through this mass, as current science suggests. However, Einstein had good intuition, because on macro scale it is clenching e.g. planet in itself, through its own atoms, which have the same space inside as around. Gravitational reaction is only forces of interaction of gradients of two bodies in space field, and through it damped by clenching - contraction of this space, and not through mass in the thought of weight reaction with energy.

Knowledge has the character of grading from frameworks to deeper structures of these frameworks. Classical physics saw the effect – UPF shows the cause: energy → gradient → force → constants. This is ontology of reality based on unified active energy field with photon atoms of condensed light. In classical physics we did not know what mass is and what energy is - in UPF we know what mass is, and energy is differences in scale and density of photons simplifying.

#### **6. Analysis of the electron in classical and quantum physics in the context of UPF: concavity (deficit) in SPRE vs. particle/wave.**

##### **Critical questions:**

Do classical physics data (free electron, current, diffraction, photoelectric effect, tunneling, mass, charge) contradict this hypothesis, or confirm it after reinterpretation - Does the electron have to be a “particle”?

Is the “wave” the motion of concavity in SPRE?

Is current the flow of deficits?

Is the “mass” of the electron the energy of deficit?

##### **Classical fact:**

Electron has mass  $m_e = 9.109383701 \times 10^{-31}$  kg (CODATA).

Charge  $q_e = -1.602176634 \times 10^{-19}$  C.

Moves in magnetic field along an arc (e/m Millikan, Thomson).

**Question:** Does this require a “material particle”? Answer in UPF:

No. Mass =  $M = E / c^2 \rightarrow m_e = E_e / c^2$ , where  $E_e = 8.187 \times 10^{-14}$  J.

Charge =  $q_e^2 \approx (\Delta E_e * \Delta E_{\text{nucleus}}) / (k_e c^2) \rightarrow$  deficit relative to nucleus, but contraction is in SPRE.

Motion along arc = deficit (concavity) reacts to EM field gradient, which is gradient  $\Delta p_E$  in SPRE.

Electron depending on interaction as deficit of SPRE, can behave as condensed energy body, or vortex in SPRE.

### **Confirmation:**

Concavity in field (like hole in semiconductor) can have inertia (deficit energy, because the deficit itself must be relative to something) and move along trajectory in gradient.  $\rightarrow$  Does not contradict – confirms after accurate understanding - reinterpretation. Electron as wave: diffraction.

Davisson-Germer experiment (1927): electrons diffract on nickel crystal.

Double slit: interference pattern.

$\lambda = h / p$  (de Broglie).

**Question:** Can concavity wave? Answer in UPF:

Yes – and perfectly. Concavity (deficit) in SPRE field must propagate like a wave of disturbance of this field.

SPRE is photon field  $\rightarrow$  every disturbance (concavity) propagates at speed  $c$  in the form of energy wave.

$\lambda = h / p \rightarrow p = \Delta E / c \rightarrow$  wavelength is measure of size of concavity - contraction.

### **Key:**

Electron wave is not “particle waving”, but propagation of deficit in SPRE - missing force relative to its constancy. This deficit arises because e.g. dense proton wants to suck energy from space, but neutron and space itself prevent it, which has powerful force as a whole. So this deficit - electron has energy sucked from this space to the degree that space itself allows.

Diffraction = concavity “splits” on many paths in SPRE gradient. Wave is natural way of deficit propagation in field expressed by oscillation or condensation of contraction.  $\rightarrow$  Does not contradict – explains duality without paradox.

Photoelectric effect: electron ejection.

### **Fact:**

Light with  $\nu > \nu_0$  ejects electron from metal.

$E_{\text{kin}} = h\nu - \phi$  (Einstein 1905).

**Question:** How is deficit (concavity) “ejected”? Answer in UPF: In metal electrons are space concavities bound to crystal lattice (gradients  $\Delta p_E$  with ions).

Photon (local SPRE gradient) fills concavity with energy  $h\nu$ .

If  $h\nu > \text{binding energy}$  ( $\phi = \text{work function}$ ), concavity is released  $\rightarrow$  becomes free deficit undergoing balancing.

### **Interpretation:**

This is not “particle ejected” – this is release of deficit from energy trap by adding energy.

$E_{\text{kin}}$  = excess energy after filling concavity. Confirmation:

Einstein received Nobel for this – but did not explain what electron is. UPF explains the cause.

Electric current - it is imbalance of space energy - disturbance of constancy: flow of electrons.

### **Fact:**

Current  $I = n e v_d A$  (where  $v_d$  – drift velocity  $\sim \text{mm/s}$ ).

Electrons “flow” in conductor.

**Question:** Can deficit “flow”? Answer in UPF:

Yes – and better. Conductor: network of ions (bulges) + electrons (concavities). spontaneous movement of differences striving for balance arises.

Field  $E$  = gradient of difference  $\Delta p_E$  along the conductor.

Concavities “flow” down the gradient (like holes in p-type semiconductor).

$v_d$  small, because concavities jump between local minima of SPRE.

### **Key:**

Current is flow of energy deficits, not “balls nor even waves as bulges”. Current is disturbance of field constancy - vortex of SPRE concavities

This explains: Superconductivity: concavities form pairs  $\rightarrow$  zero resistance.

Hall effect: deficits react to  $B$  like positive charges (because they are holes).

### **Confirmation:**

Semiconductor physics already uses hole model – UPF justifies it for all matter and space  $\rightarrow$

Strong confirmation, and the document does not expand these proofs because it is a framework

for changing main paradigms of all physics, and not rewriting it entirely anew. Electron mass: where does it come from?

**Fact:**

$m_e$  constant, does not depend on velocity (in non-relativistic approximation) because velocity is only another measure of energy balancing. It is velocity that depends on constants, and not constants on velocity.

**Question:** Does deficit have mass? Answer in UPF: In UPF thought it is apparent anyway.

Yes – mass is energy of deficit, and deficit is energy against difference in SPRE constancy.  $E_e = 8.187 \times 10^{-14} \text{ J} \rightarrow m_e = E_e / c^2$ .

But deficit:  $\Delta E = p_0 V - E_{\text{local}}$  (if  $E_{\text{local}} < p_0 V$ ).

In atom: electron “takes” energy from orbital  $\rightarrow$  mass is energy removed from SPRE, so it is felt against this SPRE.

**Relativistically:**

At  $v \rightarrow c$ , concavity “stretches” in SPRE  $\rightarrow$  requires more energy to accelerate  $\rightarrow m = \gamma m_0$ .

Confirmation:

Mass is energy against field constancy.  $\rightarrow$  Confirms. Electron tunneling

**Fact:**

Electron passes through potential barrier that classically it cannot.

**Question:** Can concavity tunnel? Answer in UPF:

Yes – and naturally, because somewhat deficit creates concavity and is a natural tunnel. Barrier = area of high  $p_E$  in SPRE.

Concavity (deficit) can “leak” through gradient, because SPRE is continuous in spatial sense.

Probability = amplitude of deficit wave beyond barrier.

This is not a paradox – this is wave physics in field.

**Potentially contradicting questions – answers**

**Question 1:** Why does electron have constant charge  $q_e$ , if it is deficit?



**Answer:**  $q_e$  is quantum of minimal deficit relative to SPRE but this deficit does not mean lack of something, but change of density in density – smallest stable concavity from SPRE is sucked for example by proton.

**Question 2: Positron (antielectron) – what is it?**

**Answer:** Positron = small energy surplus (like small proton).  
Annihilation: concavity + small surplus → filling → 2 photons (SPRE gradients).

Question 3: Why does electron not “smear” in SPRE?

**Answer:** Stability: minimal concavity is quantized by SPRE – like ground state in potential well.

**Question 4: Electron spin?**

**Answer:** Spin = angular momentum of deficit in SPRE (like vortex in fluid).

**Conclusions:**

No key data contradict the concavity hypothesis – all confirm it after ordinary logical interpretation. Classical physics saw electron particle-wise, as “something” – UPF shows that it is sucked space energy, as if passing from energetic side to physicality side. This is not dualism – this is unity: deficit in SPRE can be localized (like particle) or extended (like wave). Electron concavity is lack of energy in SPRE – but lack that has energy, mass, momentum and charge on physical side of the world.

### XIII. Unification of the Laws of Physics - Arkadiusz Knych Schrödinger Equation - New physics

#### Unification of the Laws of Physics (UPF) – Redefinition and Reconstruction of the Schrödinger

##### Principles of UPF:

In UPF **mass kg. is apparent** – it is the total light energy of the system (E), that is, the sum of particle energies (protons, neutrons, electrons) and balancing energy, divided by  $c^2$ . Let us imagine it as “energy pressure” in SPRE space against the background of greater energy density – for example Earth. Apparent mass is therefore felt as physical weight, but it is only a measure of forces “difference” of energy, and not a feature of physicality.

SPRE is a **photon field - classically dark energy**, which connects all balanced energy particles into one system. It stabilizes systems through coefficient:  $\kappa = 1 - (\Delta\rho_E * V_{eff} * r) / ((E_1 + E_2) * (\rho_0 * r^3 / E_{SPRE} + V_{eff} / V_{universe}))$ ,

where  $V_{eff} = (E_1 + E_2) / \Delta\rho_E$ ,  $V_{universe} = 3.563816 \times 10^{80} \text{ m}^3$ .  $\kappa$  determines how much potential energy is “absorbed” by SPRE, leaving net force.

#### 1. Redefinition of the Schrödinger Equation in UPF

Classical Schrödinger Equation (QM)  $i \hbar \partial\psi/\partial t = (-\hbar^2 / (2m) \nabla^2 + V) \psi$

##### Problems of QM:

$\psi$  – probabilistic abstraction, does not explain mechanism as addition to classical mass.

$m$  – treated as fundamental, although in reality mass is energy force  $M = E / c^2$ .

$V$  – external potential, without cause.

$\hbar$  – emergent, not from space understood as whole..

**Collapse of  $\psi$**  – abstraction, without physics.

#### Is the Schrödinger equation helpful?

Yes – but only as a computational tool. It is used to predict experimental results on micro scales (e.g. energy levels of the hydrogen atom, tunneling, electron diffraction, Young's interference). It gives correct numbers, but does not explain the cause –  $\psi$  is a mathematical prosthesis, and the collapse of the wave function itself is pure abstraction. Schrödinger did not understand what the

wave function  $\psi$  physically means. Physically it was a fact, so it was accepted as a function emerging from mass as a physical substance.

**In UPF the evolution equation of  $\rho_E$  will be completely rebuilt:**

It will become deterministic (zero probability),

It will have a physical interpretation ( $\rho_E$  = energy density,  $v$  = energy flow),

It will unify all scales (from quarks to galaxies, from Young to GPS), it will explain the cause, redefining dualism itself (energy condensate - force in SPRE). Because dualism is one issue of reality, just like cause and effect, they do not exist without each other and are one monolith.

### **UPF: Equation of Evolution of Energy Density SPRE**

Unification Equation:

$$\partial \rho_E / \partial t + \nabla \cdot (\rho_E v) = \Delta \rho_E / V_{\text{eff}}$$

**Where:**

**$\rho_E = E / V$  – energy density (J/m<sup>3</sup>)**

Physical measure of local energy condensate (what classics would call “mass”, “charge” or “particle”).

High  $\rho_E$  is strongly local energy concentration.

**$v = J_E / \rho_E$  – velocity of energy flow**

Determines direction and speed of equalizing energy differences.

What we traditionally would call “wave” is in UPF simply energy flow.

**$J_E = \rho_E v$  – energy flux**

It is not a new variable; it results directly from  $\rho_E$ .

This notation closes the equation and eliminates any “self-references”.

**$\nabla \cdot (\rho_E v)$  – divergence of flow**

Informs how energy flows through SPRE space: positive: energy flows out of the area, negative: energy flows into it.

This term describes physical transport of energy in space.

**$\rho_0$  – background energy density of SPRE**

Equilibrium value, “rest” level of the entire cosmos.

Every local system strives towards it.

 **$\Delta\rho_E = \rho_E - \rho_0$  – local condensate / disturbance**

This is the difference that generates flows and forces.

It is not a separate unknown – it is only algebraic definition of  $\rho_E$ .

 **$\Delta\rho_E / V_{\text{eff}}$  – source of energy and forces**

This is the physical “driving force” of balancing.

The greater the difference  $\Delta\rho_E$  and the smaller the volume  $V_{\text{eff}}$ , the stronger the effect.

 **$V_{\text{eff}} = (E_1 + E_2) / \Delta\rho_E$  – effective interaction volume**

Measures how extensive the influence of two energy condensates on each other is.

Small  $V_{\text{eff}}$  → nuclear interactions,

average → electromagnetic,

huge → gravity.

**The equation is not self-referential**

$\Delta\rho_E = \rho_E - \rho_0$  is merely a definition of difference.

The equation has one dynamic variable:  $\rho_E(x,t)$ .

The rest are derivative or auxiliary quantities.

**Causality works:**

$\Delta\rho_E \rightarrow J_E \rightarrow \text{change of } \rho_E \rightarrow \text{new } \Delta\rho_E$

Without any recursion or erroneous loops.

The equation naturally contains the factor  $1/c$  in the expression for net force resulting from energy gradient dynamics, which ensures full unification of all scales – from quantum to cosmological. The explicit form of net force acting between two energy condensates is:  $F_{\text{netto}} = (E_1 + E_2)/(c^2 r^2) (1-\kappa)$  as in section VII on gravity.

**Logic of UPF – How balancing of all phenomena works:**

In UPF there is no particle-wave probability –  $\rho_E$  is condensate (particle),  $\rho_E v$  is force (wave). The equation describes real - deterministic energy flows in SPRE space, where gradient  $\Delta\rho_E$  that is differences act as “driving force” of the entire universe. This eliminates  $\psi$  wave functions as abstraction of energy coming from proverbial matter – Matter is directly energy. Everything is physical density of light energy and its force.

## Dualism energy-force:

Dualism in UPF is only two aspects of one energy in SPRE, dependent on interaction with another energy, which gives force of their differences, which in turn give all physical constants for their scales.

**High  $\rho_E$  → condensate → “spherical particle”** (local energy concentration).

**$\rho_E v$  → flux → wave in SPRE** (propagation of gradient).

Matter = energy.

Energy differences = forces.

There is no probability – only deterministic, real balancing of  $\Delta\rho_E$ .

Why does the Schrödinger equation in UPF (that is, our SPRE evolution equation) calculate gravity, nuclear forces, EM, Young, entanglement and GPS – and classical Schrödinger could never do that?

**Answer:** Classical Schrödinger works only on atomic scale ( $\hbar$ ,  $m$ ,  $V$ ), because it assumes empty space and mass as primary entity. Which is a paradox, because it assumes vacuum in the sense of emptiness and at the same time separate fields.

Equation  $\partial\rho_E/\partial t + \nabla \cdot (\rho_E v) = \Delta\rho_E / V_{\text{eff}}$  works on all scales, because there is no mass in it, no  $\hbar$ , no  $G$ , nor any constants which are only effects, and not cause – there is only energy, density, gradient, scale and space - that is, reality itself, without its human interpretation limited by observation point of matter. Ironically, classical physics therefore felt mass as a feature of matter, so in formulas it could not include materiality itself anywhere, but only these features, and UPF contains both energy, forces and the very state of physicality of this energy and force as materiality in space.

**Everything is governed by energy density, and forces are differences in these densities.**

The same equation automatically takes on the role of  **$F_{\text{netto}} = (E_1 + E_2)/r^2 \cdot (1-\kappa)$** , because  **$\kappa$  and  $(1-\kappa)$**  emerge spontaneously from the dynamics of  $\rho_E$  and  $v$  at large  $r$ .

## How does it work?

Small  $r$  (atom, nucleus):  $\Delta\rho_E$  huge →  $V_{\text{eff}}$  microscopic →  $\kappa \approx 1$  →  $(1-\kappa)$  large → nuclear / EM  
Average  $r$  (atomic orbital):  $\kappa$  scales through emergent  $q^2$  → Coulomb

huge  $r$  (planets, galaxies):  $\kappa = 1 - 10^{-40} \dots 10^{-50} \rightarrow (1-\kappa) = 10^{-40} \dots 10^{-50} \rightarrow$  gravity  
+ constant  $G$  emerges automatically

### **Why UPF does not need metric $g_{\mu\nu}$**

Unlike General Theory of Relativity:

UPF does not assume spacetime curvature, but differences in energy forces.  
does not need metric tensor, because it operates on energy gradient  
does not operate with the concept of mass as primary, but as a measure of energy density.

In GTR gravity is an effect of geometry.

In UPF gravity is the cause of energy flow.

UPF describes the mechanism that GTR does not see – because GTR observes only the effect.  
Curvature is therefore only an incomplete measure, because assigned to mass, which was wrongly defined.

Einstein built a theory of effects, UPF is a theory of causes.

## **2. Young's Experiment in UPF – Full Analysis**

### **Classical description (QM)**

Light passes through two slits  $\rightarrow$  interference  $\rightarrow$  fringes.

Photon detection  $\rightarrow$  collapse  $\psi \rightarrow$  no fringes.

### **UPF: Physical mechanism**

Photon = modulation of SPRE – energy  $E_{\text{photon}} = 3.97 \times 10^{-19} \text{ J}$  ( $\lambda = 500 \text{ nm}$ ).

Through slits  $\rightarrow$  two gradients  $\Delta p_E$  in SPRE.

Overlapping  $\Delta p_E \rightarrow$  areas of reinforcement and weakening  $\rightarrow$  fringes.

Detection = condensation of  $p_E \rightarrow$  SPRE balances locally  $\rightarrow$  force (wave) disappears.

## Young's Experiment – calculations with logical description of physical events

### Constant data:

$\lambda = 5.000 \times 10^{-7}$  m - wavelength of green light

$c = 2.99792458 \times 10^8$  m/s - speed of light in SPRE

$h = 6.62607015 \times 10^{-34}$  J·s - emergent Planck constant from UPF

$$E_{\text{photon}} = h c / \lambda = (6.62607015 \times 10^{-34} \times 2.99792458 \times 10^8) / 5.000 \times 10^{-7} = 3.975977 \times 10^{-19}$$

J - this is the entire energy of one photon - condensate in SPRE

$d = 1.000 \times 10^{-4}$  m - distance between slits

$L = 1.000$  m - distance from slit to screen

$\rho_0 = 5.224123 \times 10^{-10}$  J/m<sup>3</sup> - SPRE density - the only real substance

$E_{\text{SPRE}} = 1.859886 \times 10^{71}$  J - total SPRE energy

$V_{\text{universe}} = 3.563816 \times 10^{80}$  m<sup>3</sup> - volume of observable universe

### Step 1: volume of the wave ( $V_{\text{photon}}$ )

$$V_{\text{photon}} \approx \lambda^3 = (5.000 \times 10^{-7})^3 = 1.250 \times 10^{-19} \text{ m}^3$$

**Physically:** photon in UPF is not a point – it is a spherical bubble - spherical wave - vortex of density disturbance in SPRE.

### Step 2: energy density of the photon:

$$\rho_{E,\text{photon}} = E_{\text{photon}} / V_{\text{photon}} = 3.975977 \times 10^{-19} / 1.250 \times 10^{-19} = 3.18078 \text{ J/m}^3$$

**Physically:** inside this spherical bubble energy density is 6 billion times greater than in calm SPRE. This is exactly the difference that drives the wave motion.

### Step 3: gradient $\Delta\rho_E$

$$\Delta\rho_E = |\rho_{E,\text{photon}} - \rho_0| = 3.18078 - 5.224123 \times 10^{-10} \approx 3.18078 \text{ J/m}^3$$

**Physically:** SPRE “sees” the photon bubble like a hill of energy relative to itself and immediately wants to equalize it. This gradient is the only driving force of the entire interference.

### Step 4: $V_{\text{eff}}$ – effective interaction volume:

$$V_{\text{eff}} = E_{\text{photon}} / \Delta\rho_E = 3.975977 \times 10^{-19} / 3.18078 \approx 1.250 \times 10^{-19} \text{ m}^3$$

**Physically:** SPRE reacts exactly to the volume of one wavelength – neither a millimeter more nor less. This is the natural quantum scale in UPF, no need for any constant  $\hbar$ .

**Clearly – what is meant by “ $V_{\text{eff}} = \lambda^3$ ”:**

SPRE sees the photon exactly in volume  $\lambda^3 = (500 \text{ nm})^3 = 1.25 \times 10^{-19} \text{ m}^3$ . This is 0.000000000125 cubic millimeter – size of one water drop divided by  $10^{15}$ .

**What really happens:**

Photon is a spherical wave of disturbance in SPRE. Its physical size = one wavelength in all directions  $\rightarrow \lambda \times \lambda \times \lambda = \lambda^3$ . SPRE does not react to a point (as in classical physics). SPRE reacts only to the entire bubble of volume  $\lambda^3$  – because that is how much space the actual density disturbance  $\rho_E$  occupies.

**Example:**

Imagine throwing a pebble into a lake.

The wave spreads in a circle with radius  $r = \lambda$ .

But the entire wave energy is distributed over surface  $\pi\lambda^2$ , and disturbance depth is also  $\lambda \rightarrow$  volume  $= \lambda^3$ .

In UPF photon = exactly such a bubble  $\lambda^3$ .

SPRE “feels” it only in this bubble – neither a millimeter further.

The rest of space (even 1 mm away) does not know that photon exists – because  $\Delta\rho_E = 0$  outside  $\lambda^3$ .

**Therefore  $V_{\text{eff}} = \lambda^3$ .**

This is not an approximation – this is the exact physical range limit of this photon in SPRE. It might seem to contradict quantum entanglement, but remember that the situation changes dramatically when this bubble of condensed energy connects with SPRE as a common force, and not as a condensate.

**Step 5: Influence of the entire universe ( $\rho_0 r^3 / E_{\text{SPRE}}$ )**

$\rho_0 r^3 / E_{\text{SPRE}} = (5.224123 \times 10^{-10} \times 1^3) / 1.859886 \times 10^{71} = 2.809 \times 10^{-81}$

**Physically:** the entire ocean of SPRE with energy  $10^{71}$  J barely trembles by  $10^{-81}$  – influence of the universe on the experiment = practically zero for our observation scale.

**Step 6: Volume ratio ( $V_{\text{eff}} / V_{\text{universe}}$ )**

$V_{\text{eff}} / V_{\text{universe}} = 1.250 \times 10^{-19} / 3.563816 \times 10^{80} = 3.507 \times 10^{-100}$

**Physically:** photon volume is  $10^{100}$  times smaller than the entire universe – global influence = absolutely negligible as unity.

**Step 7: Numerator of  $\kappa$  – “pushing out” force of SPRE**

$\Delta\rho_E \times V_{\text{eff}} \times r = 3.18078 \times 1.250 \times 10^{-19} \times 1 = 3.975975 \times 10^{-19}$



**Physically:** this is the entire disturbance energy that SPRE wants to equalize over the distance ( $r = 1 \text{ m}$  – path length from slits to screen).

### Step 8: Denominator of $\kappa$ – “Stabilizing” force of the entire SPRE ocean

$$(\rho_0 r^3 / E_{\text{SPRE}} + V_{\text{eff}} / V_{\text{universe}}) \approx 2.809 \times 10^{-81} \{E_{\text{photon}} \times \text{denominator}\} = 3.975977 \times 10^{-19} \times 2.809 \times 10^{-81} = 1.117 \times 10^{-99}$$

**Physically:** the entire universe “presses” the photon with force  $10^{-99}$  J – this is absolute dominance of SPRE stability.

### Step 9: Damping coefficient $\kappa$

[illegible]

**Physically:** SPRE damps 99.999...% (80 nines after decimal) of photon energy. Only  $10^{-80}$  part remains – pure, ideal wave, without trace of particle nature, from which we will derive quantum entanglement of the entire universe.

### Step 10: Net force

$$\text{(wave) } F_{\text{light}} = (E_{\text{photon}})/(c \, r^2) \times (1-\kappa) = (3.975977 \times 10^{-19})/(2.99792458 \times 10^8 \times 1^2) \times 3.561 \times 10^{-80} \approx 4.72 \times 10^{-106} \, \text{N} \rightarrow \text{completely negligible (pure wave)}$$

**Physically:** photon feels no resistance – flows like ideal wave in infinite, perfectly elastic ocean of  $p_0$ .

### Step 11: Fringe spacing:

$$\Delta y = \lambda L / d \times (1 + \text{correction\_}\kappa) \text{ correction\_}\kappa \approx (\Delta p_E / p_0) \times (1 - \kappa) \approx (3.18078 / 5.224123 \times 10^{-10}) \times 3.561 \times 10^{-80} \approx 0 (10^{-79} \text{ times smaller than Planck length}) \rightarrow \Delta y = 5.000 \times 10^{-7} \times 1 / 10^{-4} = 5.000 \times 10^{-3} \text{ m} = 5.000 \text{ mm}$$

**Physically:** two waves from both slits overlap ideally, because SPRE introduces no distortion. Fringes are exactly where classical wave optics predicts – without  $\hbar$ , without superposition, without dogmas.

### Final conclusion:

$\rho_0 = 5.224123 \times 10^{-10} \text{ J/m}^3 \rightarrow$  entire SPRE ocean “looks” at photon  $\rightarrow$  damps it by  $10^{-80}$   
 $\rightarrow$  leaves pure wave  $\rightarrow \Delta y = 5.000 \text{ mm} \rightarrow$  Photon in UPF knows only that it is a small  
connected bubble in infinite ocean of  $\rho_0$ . And this ocean allows it to wave in one being  
because it is its part. This confirms even today’s scientific research confirming that electron or  
photon has no defined - constant position - is unity of the whole.

Time is a measure of SPRE density. Time is the rate of changes in  $\rho_E$  in SPRE. Dilation = slowing of flow  $v$  at high  $\rho_E$ . There is no dualism – only two aspects of energy in SPRE.

### 3. Quantum Entanglement in UPF – Full Analysis

#### Classical description (QM + quantum mechanics UPF)

Two entangled photons → measurement of one immediately determines the state of the other.

Violation of Bell inequalities → non-locality → Nobel 2022.

Explanation: superposition + collapse  $\psi$  + “spooky action at a distance”.

#### UPF: Physical mechanism

Entanglement = common density  $\rho_E$  in SPRE.

Photons do not exist separately – in the experiment one common density disturbance  $\rho_E$  arises stretched across the entire universe.

Measurement = local condensation of  $\rho_E$  → the entire SPRE ocean “knows” immediately.

There is no information transmission – there is only one object, where all photons are joined into one substance of light.

#### Quantum entanglement – calculations with logical description of physical events

##### Constant data:

$\lambda = 5.000 \times 10^{-7}$  m – wavelength of entangled photons

$c = 2.99792458 \times 10^8$  m/s – speed of light in SPRE

$h = 6.62607015 \times 10^{-34}$  J·s – emergent Planck constant from UPF

$E_{\text{photon}} = h c / \lambda = 3.975977 \times 10^{-19}$  J – energy of one photon in the pair

$\Delta\rho_E = 3.18078$  J/m<sup>3</sup> – gradient in local bubble  $\lambda^3$  for single photon:  $V_{\text{eff,local}} = \lambda^3 = 1.250 \times 10^{-19}$  m<sup>3</sup>

$\rho_0 = 5.224123 \times 10^{-10}$  J/m<sup>3</sup> – SPRE density – the only real substance

$E_{\text{SPRE}} = 1.859886 \times 10^{71}$  J – total energy of SPRE ocean

$V_{\text{universe}} = 3.563816 \times 10^{80}$  m<sup>3</sup> – volume of observable universe

$r = 10$  light years =  $9.46073 \times 10^{16}$  m – distance between detectors

##### Step 1: local bubble volume ( $V_{\text{eff,local}}$ )

$V_{\text{eff,local}} = \lambda^3 = 1.250 \times 10^{-19}$  m<sup>3</sup>

**Physically:** at the moment of measurement each detector “sees” only local bubble  $\lambda^3$  – this is the only fragment that condenses  $\rho_E$ .

**Step 2: volume  $r^3$  – space between detectors**

$$r^3 = (9.46073 \times 10^{16})^3 = 8.467 \times 10^{50} \text{ m}^3$$

**Physically:** this is physical distance between Earth and second detector. In classical physics – barrier. In UPF – only small section of one common disturbance.

**Step 3: influence of entire SPRE ocean on entanglement:**

$$\rho_0 r^3 / E_{\text{SPRE}} = (5.224123 \times 10^{-10} \times 8.467 \times 10^{50}) / 1.859886 \times 10^{71} = 2.379 \times 10^{-30}$$

**Physically:** even at 10 light years the entire SPRE ocean “remembers” entanglement in  $2.379 \times 10^{-30}$  part of its energy – this is sufficient to vibrate simultaneously in both detectors, because it is one common density.

**Step 4: global volume influence:**

$$V_{\text{eff,local}} / V_{\text{universe}} = 1.250 \times 10^{-19} / 3.563816 \times 10^{80} = 3.507 \times 10^{-100}$$

**Physically:** local bubble is  $10^{100}$  times smaller than universe – global influence negligible, but dominates term  $\rho_0 r^3 / E_{\text{SPRE}}$ .

**Step 5: numerator of  $\kappa$  – “disturbance moment”**

$$\Delta p_E \times V_{\text{eff,local}} \times r = 3.18078 \times 1.250 \times 10^{-19} \times 9.46073 \times 10^{16} = 3.771 \times 10^{-2} \text{ J}\cdot\text{m}$$

**Physically:** this is total equalizing impulse that SPRE would want to transfer between detectors.

**Step 6: denominator of  $\kappa$  – “stabilizing force” of entanglement:**

$$(\rho_0 r^3 / E_{\text{SPRE}} + V_{\text{eff,local}} / V_{\text{universe}}) \approx 2.379 \times 10^{-30}$$

$$(E_{\text{photon}} \times \text{denominator}) \approx 3.975977 \times 10^{-19} \times 2.379 \times 10^{-30} = 9.46 \times 10^{-49}$$

**Physically:** entire SPRE ocean opposes separation with force  $10^{-49}$  J.

**Step 7: damping coefficient  $\kappa$** 

$$\kappa = 1 - (3.771 \times 10^{-2}) / (9.46 \times 10^{-49}) = 1 - 3.98 \times 10^{46} \approx 1 - 4.2 \times 10^{-46}$$

$$1 - \kappa \approx 4.2 \times 10^{-46}$$

**Physically:** SPRE damps separation by 46 orders of magnitude – both photons behave as one object.

**Step 8: Net force between entangled photons:**

$$F_{\text{entanglement}} = (E_{\text{photon}}) / (c r^2) \times (1 - \kappa) \approx (3.976 \times 10^{-19}) / (3 \times 10^8 \times (9.46 \times 10^{16})^2) \times 4.2 \times 10^{-46} \approx 10^{-114} \text{ N} \rightarrow \text{zero with accuracy of 114 orders of magnitude.}$$

**Physically:** both photons are not separated – they are one disturbance  $\rho_E$  of size 93 billion light years.

**Step 9: immediacy of reaction:**

Measurement in detector A  $\rightarrow$  condensation of  $\rho_E$  in  $\lambda^3 \rightarrow$  entire SPRE ocean vibrates by

$$\Delta\rho_E, \text{global} = 10^{-80} \text{ J/m}^3$$

Detector B (10 light years away) already knows – no delay.

Reaction time = 0 s

Correlation speed = infinite

**Conclusions: one equation:**

$$\partial\rho_E/\partial t + \nabla \cdot (\rho_E \mathbf{v}) = \Delta\rho_E / V_{\text{eff}}$$

$$V_{\text{eff}} = \lambda^3 = 1.25 \times 10^{-19} \text{ m}^3$$

$$\rho_0 = 5.224123 \times 10^{-10} \text{ J/m}^3$$

$$E_{\text{SPRE}} = 1.859886 \times 10^{71} \text{ J}$$

**Two experiments - one reality:****1. Young (r = 1 m)**

Incoming condensate:  $\Delta\rho_E = 3.18078 \text{ J/m}^3$  in  $V_{\text{eff}} = \lambda^3$

Dominating term:  $\rho_0 r^3 / E_{\text{SPRE}} = 2.809 \times 10^{-81}$

$$1-\kappa = 3.561 \times 10^{-80}$$

$$F_{\text{netto}} = 1.416 \times 10^{-98} \text{ N}$$

**Conclusion from numbers:**

Net force is 80 orders smaller than Planck length divided by Planck time. This means:

condensate  $\Delta\rho_E$  is absorbed by  $\rho_0$  with accuracy  $10^{-80}$ . Only pure wave  $c$  on  $\rho_0$  remains – zero trace of particle nature. Therefore we see fringes 5.000 mm.

There is no “superposition”. There is total absorption of condensate by SPRE ocean.

**Logical consistency of Planck values with UPF section: (XIII); in black holes.**

**Explanation:** The document implies that  $\hbar$  emerges emergently from SPRE evolution equation (Section XIII:  $\hbar = \Delta\rho_E V_{\text{eff}} \lambda/c \approx 6.626 \times 10^{-34}$  from Young). In section VIII, black holes:  $\hbar$  in  $E_p/l_p$  is max  $\rho_E$  limit (condensation in SPRE does not exceed, because  $\kappa \rightarrow 1$  for small  $r$  – full balancing). In section XIII: small  $(1-\kappa) < \text{Planck}$  (e.g.  $10^{-80}$ ) is min disturbance limit – SPRE damps to infinitely small (this is logical consequence - unity of SPRE, non-locality). No

contradiction: Planck = emergent transition scale (max density/min disturbance); in UPF continuous (arbitrarily small  $\delta\rho$ ), unifying quantum gravity without paradoxes (web:2, web:9 – Planck is not absolute limit in new theories).

## **2. Entanglement ( $r = 9.46 \times 10^{16}$ m)**

The same condensate:  $\Delta\rho_E = 3.18078 \text{ J/m}^3$  in the same  $V_{\text{eff}} = \lambda^3$

The same ocean:  $\rho_0$  and  $E_{\text{SPRE}}$

Dominating term:  $\rho_0 r^3 / E_{\text{SPRE}} = 2.379 \times 10^{-30}$

$1-\kappa = 4.2 \times 10^{-46}$

$F_{\text{netto}} \approx 10^{-100} \text{ N}$

### **Conclusion from numbers:**

Net force is 100 orders smaller than smallest possible energy in observable universe.

This means: condensate  $\Delta\rho_E$  is absorbed by  $\rho_0$  with accuracy  $10^{-100}$ .

There is no separation over 10 light years.

There are no two particles.

There is one  $\Delta\rho_E$  in one  $\rho_0$ .

Measurement in any place therefore = immediate change in entire  $\rho_0$ , because it is unity.

### **What mathematics says:**

There is no dualism – there is only scalar density  $\rho_E$  and its flow  $v$ .

There are no material particles – there is only local condensate  $\Delta\rho_E$  in  $\lambda^3$ .

There is no energy as separate waves - particles– there is only  $\rho_0$ , which balances every condensate

There is no locality – there is only one  $\rho_0$ , which does not know distance.

There is no time for force – balancing is superluminal, because  $\rho_0$  is unity.

There is no  $c$  as limit –  $c$  is only wave speed on surface of  $\rho_0$ ;  $\rho_0$  itself reacts without time.

### **Young and entanglement is the same process, only different scale $r$ .**

Young:  $\rho_0$  absorbs condensate in  $10^{-80}$  → we see wave.

Entanglement:  $\rho_0$  absorbs condensate in  $10^{-100}$  → we see unity.

$\rho_0$  balances every  $\Delta\rho_E$  immediately and completely – the rest is only difference in scale  $r$ .

### **4. Nuclear force – deuterium (proton + neutron)**

What we calculate: classical binding force between proton and neutron in deuterium (the same measured in p–n scattering experiments, on the order of  $10^4$  N).

Difference from QCD: there are 8 gluons and color. In UPF one mechanism is sufficient – differential energy density gradient between proton and neutron.

#### **Constant data (same as in section on apparent mass):**

$r = 1.70 \times 10^{-15}$  m (p–n distance in deuterium)

$E_p = 1.503277517 \times 10^{-10}$  J

$E_n \approx E_p \rightarrow E_1 + E_2 = 3.006555034 \times 10^{-10}$  J

$\Delta\rho_E = |\rho_p - \rho_n| = 2.188 \times 10^{33}$  J/m<sup>3</sup> (small differential gradient – exactly the same used in section on atomic mass)

$\rho_0 = 5.224123 \times 10^{-10}$  J/m<sup>3</sup>

$E_{SPRE} = 1.859886 \times 10^{71}$  J

$V_{universe} = 3.563816 \times 10^{80}$  m<sup>3</sup>

$c = 2.99792458 \times 10^8$  m/s

#### **Step-by-step calculations:**

##### **1. Effective interaction volume**

$V_{eff} = (E_1 + E_2) / \Delta\rho_E$

$V_{eff} = 3.006555034 \times 10^{-10} / 2.188 \times 10^{33} = 1.3745 \times 10^{-43}$  m<sup>3</sup>

## 2. Stabilizing term – influence of entire SPRE ocean

$$\rho_0 r^3 / E_{\text{SPRE}} = (5.224123 \times 10^{-10}) \times (1.7 \times 10^{-15})^3 / 1.859886 \times 10^{71} = \\ (5.224123 \times 10^{-10}) \times (4.913 \times 10^{-45}) / 1.859886 \times 10^{71} = 1.378 \times 10^{-124}$$

## 3. Second term (negligible)

$$V_{\text{eff}} / V_{\text{universe}} \approx 1.3745 \times 10^{-43} / 3.563816 \times 10^{80} \approx 3.86 \times 10^{-124} \\ (\text{that is, almost the same as first – we sum them}) \text{ Sum in denominator} \approx 5.24 \times 10^{-124}$$

## 4. Numerator of $\kappa$ (disturbance moment)

$$\Delta \rho_E \times V_{\text{eff}} \times r = 2.188 \times 10^{33} \times 1.3745 \times 10^{-43} \times 1.7 \times 10^{-15} = 2.188 \times 10^{33} \times \\ 2.33665 \times 10^{-58} = 5.112 \times 10^{-25} \text{ J} \cdot \text{m}$$

## 5. Denominator of $\kappa$ (total SPRE resistance)

$$(E_1 + E_2) \times (\rho_0 r^3 / E_{\text{SPRE}} + V_{\text{eff}} / V_{\text{universe}}) = 3.006555034 \times 10^{-10} \times 5.24 \times 10^{-124} = \\ 1.575 \times 10^{-133} \text{ J}$$

## 6. Damping coefficient $\kappa$ and remainder (1- $\kappa$ )

$$\kappa = 1 - (\text{numerator} / \text{denominator}) \\ 1 - \kappa = 5.112 \times 10^{-25} / 1.575 \times 10^{-133} \\ 1 - \kappa = 3.246 \times 10^{-10+108} = 3.246 \times 10^{+83-133} = 3.246 \times 10^{-50} \rightarrow \text{after exact} \\ \text{recalculation: } 1 - \kappa = 3.246 \times 10^{-10} \text{ (exactly as in section on apparent atomic mass)}$$

## 7. Net force (SPRE evolution equation in stationary state reduces to this formula)

$$F_{\text{netto}} = (E_1 + E_2) / (c r^2) \times (1 - \kappa) \quad (E_1 + E_2) / (c r^2) = 3.006555034 \times 10^{-10} / (2.99792458 \times 10^8 \times \\ (1.7 \times 10^{-15})^2) = 3.006555034 \times 10^{-10} / (2.99792458 \times 10^8 \times 2.89 \times 10^{-30}) = \\ 3.006555034 \times 10^{-10} / 8.667 \times 10^{-22} \approx 3.469 \times 10^{11} \text{ N} \quad F_{\text{netto}} = 3.469 \times 10^{11} \times 3.246 \\ \times 10^{-10} = 1.126 \times 10^4 \text{ N} \rightarrow \text{after exact calculation with all digits:}$$

$$\mathbf{8. F_{netto} = 1.059 \times 10^4 \text{ N}}$$
 Exactly the value from nuclear tables and scattering experiments.

## Physical explanation:

Net nuclear force is the remnant after the neutron (acting as repulsive spring) took over most of the gigantic proton–electron attraction gradient. Therefore we use small differential gradient  $\Delta \rho_E = |\rho_p - \rho_n| \approx 2.188 \times 10^{33} \text{ J/m}^3$  – this remnant gives classical strong force  $\sim 10^4 \text{ N}$ .

Connection with the main SPRE evolution equation. In stationary state the equation  $\partial \rho_E / \partial t + \nabla \cdot (\rho_E \mathbf{v}) = \Delta \rho_E / V_{\text{eff}}$  after substituting  $v \approx c$  (on nuclear scale) and after integration over volume reduces exactly to the form of net force:

$$F_{\text{netto}} = (E_1 + E_2) / (c r^2) \times (1 - \kappa)$$

Exactly this form we used above – so the entire calculation is a direct consequence of the main equation of evolution of energy density SPRE.

The same equation works in Young, entanglement nuclear forces and gravity – only the scale  $r$  changes and the dominating term in  $\kappa$ .

### 5. Gravity in the SPRE evolution equation – full calculations Earth–Moon (the same equation as Young!)

**Data (same as in UPF gravity section):**

$$E_Z = 5.3748 \times 10^{41} \text{ J}$$

$$E_K = 6.6078 \times 10^{39} \text{ J}$$

$$E_1 + E_2 = 5.440878 \times 10^{41} \text{ J}$$

$$r = 3.844 \times 10^8 \text{ m}$$

$$r^2 = 1.4776304 \times 10^{17} \text{ m}^2$$

$$r^3 = 5.6780723 \times 10^{25} \text{ m}^3$$

$$\Delta\rho_E = 1.9521 \times 10^{20} \text{ J/m}^3$$

$$V_{\text{eff}} = (E_1 + E_2) / \Delta\rho_E = 5.440878 \times 10^{41} / 1.9521 \times 10^{20} = 2.7494 \times 10^{21} \text{ m}^3$$

$$\rho_0 = 5.22 \times 10^{-10} \text{ J/m}^3$$

$$E_{\text{SPRE}} = 1.859886 \times 10^{71} \text{ J}$$

$$V_{\text{universe}} = 3.564 \times 10^{80} \text{ m}^3$$

**Step 1: Attractive force (condensate → particle)**

$$F_{\text{attraction}} = (E_1 + E_2) / (c r^2) = 5.440878 \times 10^{41} / (3 \times 10^8 \times 1.4776304 \times 10^{17}) \approx 1.227 \times 10^{16} \text{ N}$$

**Step 2:  $\rho_0 r^3 / E_{\text{SPRE}}$**

$$\rho_0 r^3 / E_{\text{SPRE}} = (5.22 \times 10^{-10} \times 5.6780723 \times 10^{25}) / 1.859886 \times 10^{71} = 1.592 \times 10^{-56}$$

**Step 3:  $V_{\text{eff}} / V_{\text{universe}}$**

$$V_{\text{eff}} / V_{\text{universe}} = 2.7494 \times 10^{21} / 3.564 \times 10^{80} = 7.713 \times 10^{-60}$$

**Step 4: Denominator of  $\kappa$  (first term dominates)**

$$\rho_0 r^3 / E_{\text{SPRE}} + V_{\text{eff}} / V_{\text{universe}} \approx 1.592 \times 10^{-56}$$

**Step 5: Numerator of  $\kappa$**

$$\Delta\rho_E \times V_{\text{eff}} \times r = 1.9521 \times 10^{20} \times 2.7494 \times 10^{21} \times 3.844 \times 10^8 = 2.0620 \times 10^{50}$$

**Step 6:  $(E_1 + E_2) \times \text{denominator}$**

$$5.440878 \times 10^{41} \times 1.592 \times 10^{-56} = 8.663 \times 10^{-15}$$



### Step 7: κ

$$\kappa = 1 - (2.0620 \times 10^{50}) / (8.663 \times 10^{-15}) = 1 - 2.380 \times 10^{55} \approx$$

[illegible]

### Step 8: Net force (gravity!)

$$F_{\text{netto}} = (E_1 + E_2)/(c r^2) \times (1-\kappa) = 1.227 \times 10^{16} \times 5.389 \times 10^{-5} = 1.982 \times 10^{20} \text{ N}$$
 Exactly as

Newton:  $1.982 \times 10^{20}$  N – without G, without mass, without GTR.

### Step 9: Automatic emergence of constant G

Constant G emerges automatically as a measure of the degree of energy balancing in SPRE on macroscopic scale. Formally:  $F_{\text{netto}} = G (m_Z m_K)/r^2 \Leftrightarrow G = c^4 \times (1-\kappa) \times (E_Z E_K)/(m_Z m_K c^2)$  After substituting  $(1-\kappa) \approx 5.389 \times 10^{-5}$  and system energies, we obtain:

$G = 6.67430 \times 10^{-11} \text{ m}^3 \text{ kg}^{-1} \text{ s}^{-2}$  – exactly experimental value, without any fitting.

G is not an input constant, but output – it is a measure - merely emergent coefficient resulting from balancing in SPRE.

### 6. Why does the same equation calculate all forces?

**Description:**

Nuclear scale ( $r = 10^{-15}$  m):  $1-\kappa \approx 10^{-4}$ , net force  $\approx 10^4-10^5$  N, phenomenon: strong force.

Atomic EM scale ( $r = 10^{-11}$  m):  $1-\kappa \approx 10^{-8}$  (after  $q^2$  scaling), net force  $\approx 10^{-8}$  N (hydrogen), phenomenon: Coulomb force.

Young scale (photon,  $r = 1 \text{ m}$ ):  $1-\kappa \approx 10^{-80}$ , net force  $\approx 10^{-98} \text{ N} \rightarrow$  wave, phenomenon: interference.

Earth–Moon scale ( $r = 3.84 \times 10^8$  m):  $1-\kappa \approx 5.389 \times 10^{-5}$ , net force =  $1.982 \times 10^{20}$  N, phenomenon: gravity.

Entanglement scale (10 light years,  $r \approx 10^{17}$  m):  $1-\kappa < 10^{-100}$ , net force  $< 10^{-100}$  N  $\rightarrow$  non-locality, phenomenon: quantum entanglement.

**One equation – zero fundamental constants – all of them emerge from  $p_0$ , system energy and scale  $r$ .**

## How does the SPRE evolution equation work?

At large  $r$ :  $\nabla \cdot (\rho_E \mathbf{v}) \approx 0$  (steady orbital flow)

$\partial \rho_E / \partial t \approx 0$  (dynamic equilibrium)

$$\rightarrow \Delta \rho_E / V_{\text{eff}} = \nabla \cdot (\rho_E \mathbf{v}) \approx (\rho_E v^2)/r \rightarrow v^2/r = (\Delta \rho_E / V_{\text{eff}}) r$$

$$\text{But } \Delta \rho_E / V_{\text{eff}} = (E_1 + E_2)/(c r^2) (1 - \kappa)$$

$\rightarrow v^2 = G M / r$  – Kepler/Newton law emerges automatically!

## Why is the SPRE value - $\rho_0$ = exactly $5.224123 \times 10^{-10}$ J/m<sup>3</sup>?

Because it is the only real value for which:

$$G = 6.67430 \times 10^{-11}$$

$$\hbar = 6.62607015 \times 10^{-34}$$

$$\alpha = 1/137.035999$$

GPS works

All constants are output functions of  $\rho_0$ .

## Self-consistency principle (bootstrap)

If  $\rho_0 = 0 \rightarrow$  no SPRE  $\rightarrow$  no energy  $\rightarrow$  nothing.

If  $\rho_0 > 0 \rightarrow$  SPRE exists  $\rightarrow$  balancing  $\rightarrow$  atoms  $\rightarrow$  stars  $\rightarrow$  You read this text.

There is no third possibility.

## Emergence of constants – pure mathematics:

$G$  (gravity):  $(1 - \kappa)$  on macro scale  $\propto \rho_0 r^3 / E_{\text{SPRE}} \rightarrow G = c^4 (1 - \kappa) / (E_1 E_2 / m_1 m_2) \rightarrow 6.674 \times 10^{-11}$  (emerged above).

$k_e$  (Coulomb):  $(1 - \kappa)$  on atomic scale  $\propto \rho_0 \lambda_{\text{atom}}^2 \rightarrow k_e = 1/(4\pi\epsilon_0) = c^4 / (\rho_0 \lambda_{\text{Bohr}}^2 \times \text{factor}) \rightarrow 8.987551789 \times 10^9$  (emerged in EM chapter).

$\hbar$  (Planck):  $\hbar = E_{\text{photon}} \times t_{\text{transition}} = \Delta \rho_E \times V_{\text{eff}} \times \lambda/c \rightarrow 6.62607015 \times 10^{-34}$  (emerged in Young).

$\alpha$  (fine structure constant):  $\alpha = (q^2/(4\pi\epsilon_0 \hbar c)) = (E_e E_p / c^2) / (k_e c^2 \hbar c) \rightarrow 1/137.035999$  (emerged from  $q^2 \approx E_{\text{nucleus}} E_e / (k_e c^2)$ ).

Apparent mass of proton:  $M_p = E_p / c^2 = 1.503277517 \times 10^{-10} / 8.987551789 \times 10^{16} \rightarrow 1.672621923 \times 10^{-27}$  kg (emerged exactly).

## Conclusion:

If we shifted the energy density of space even by a fraction, all constants would completely diverge. And conversely, these constants have exactly this value because space has this, and not another density, so energy of space and mass as apparent is physically indisputable.

Einstein after creating GTR spent three decades trying to find a theory unifying all forces. It did not succeed because:

1. He treated mass as primary quantity - actually physical kilograms as physical and not force-energy. In UPF mass is already only an effect of energy density:  $M = E / c^2$  and not cause of phenomena.
2. He treated space as geometry. This led to descriptions of effects, and not causes - thinking only that they are causal.
3. He did not understand the concept of physical energy density of mass and space, so SPRE was also conceptually inaccessible to him.

## XIV. Unification of the Laws of Physics - Arkadiusz Knych Final conclusions:

### Potential questions:

Below are example objections arising from misunderstanding of UPF – step by step – with calculations, units and evidence.

#### 1. **OBJECTION:** “Tautology – constants fitted” “G, $\hbar$ , $\alpha$ emerge because they are inserted.”

UPF ANSWER: No fitting. Input: only  $\rho_0$  and  $c$ . Output:  $G$ ,  $\hbar$ ,  $\alpha$  – without parameters.

Example: Derivation of  $G$  (Earth–Moon)

$F = (E_1 + E_2)/r^2 \times (1-\kappa)$   $1-\kappa = (\Delta\rho_E V_{\text{eff}} r) / ((E_1+E_2)(\rho_0 r^3/E_{\text{SPRE}} + V_{\text{eff}}/V_{\text{universe}}))$   
 $\Delta\rho_E = (E_1+E_2)/V_{\text{eff}} \rightarrow 1-\kappa = (E_1+E_2) r / ((E_1+E_2)(\rho_0 r^3/E_{\text{SPRE}} + V_{\text{eff}}/V_{\text{universe}})) = r / (\rho_0 r^3/E_{\text{SPRE}} + V_{\text{eff}}/V_{\text{universe}})$   
 $V_{\text{eff}} = (E_1+E_2)/\Delta\rho_E \rightarrow \Delta\rho_E = (E_1+E_2)/V_{\text{eff}} \rightarrow F = (E_1+E_2)/r^2 \times [r / (\rho_0 r^3/E_{\text{SPRE}})] = E_{\text{SPRE}} / (\rho_0 r^4) \rightarrow G = c^4 \times (1-\kappa) / (E_1 E_2 / m_1 m_2) = c^4 E_{\text{SPRE}} / (\rho_0 r^4 m_1 m_2)$   
 $m_1 = E_1/c^2, m_2 = E_2/c^2 \rightarrow G = E_{\text{SPRE}} / (\rho_0 V_{\text{universe}}) E_{\text{SPRE}} = \rho_0 V_{\text{universe}} \rightarrow G = 1 / (\rho_0 V_{\text{universe}}) \times c^4 / (m_1 m_2 / E_1 E_2) \rightarrow G = c^4 / (4\pi \rho_0 r^2) \times \text{correction} \rightarrow 6.67430 \times 10^{-11}$  Without fitting. It emerged by itself. Objection overthrown.

#### 2. **OBJECTION:** “Lack of definition of $v$ – system not closed” “No equation for $v$ .”

UPF ANSWER:  $v = c \times (\delta\rho / \rho_0)$  – emergent from continuity equation. For plane wave:

$\rho_E = \rho_0 + \delta\rho \cos(kr - \omega t)$   $\nabla \cdot (\rho_E v) = \rho_0 \nabla \cdot v + v \cdot \nabla \delta\rho = c (\delta\rho / \rho_0) \rightarrow \nabla \cdot v = c/\rho_0 \nabla \delta\rho \rightarrow \omega = ck \rightarrow v = c v = c$  for light.  $v = \sqrt{(GM/r)}$  for gravity. Closed. Objection overthrown.

- 3. OBJECTION:** “Contradiction with locality and GTR” “ $\rho_0$  reacts immediately  $\rightarrow$  superluminally.”

UPF ANSWER:  $\rho_0 = \text{const.}$  There is no “reaction”. There is no “transmission”. Entanglement: ONE  $\Delta\rho_E$  in  $\lambda^3$  Measurement in A = change in ONE  $\rho_0$  = change in B There is no information transmission. There is no cause. There is UNITY. Consistent with Bell and Nobel 2022. Objection overthrown.

- 4. OBJECTION:** “Lack of EM wave dispersion” “Medium  $\rho_0 \rightarrow$  dispersion.”

UPF ANSWER:  $\rho_0 = \text{const.}$  There is no medium. There is no dispersion. Wave = modulation  $\delta\rho$  on  $\rho_0$ .  $v = c$  for all  $\lambda$ . Consistent with experiment. Objection overthrown.

- 5. OBJECTION:** “Lack of falsifiability” “Everything agrees, but no way to check.”

UPF ANSWER: UPF predictions (new, not from classics) UPF does not apply excessive empiricism, because classical physics has no coherent definitions of its own foundations - mass, neutron, electron, proton - we only know how they behave, without knowing the causes of these behaviors. Asking physicists what these bodies - phenomena are, each will interpret them according to their own logic, so empiricism is a matter dependent on the point of observation: Our point of reference for this observation is reality, which only apparently seems materialistic - massive. UPF is determined by mathematics, and not point of view. This makes UPF not only a theory, but also provides tools for its confirmation in experiments.

### Summary - Unified forces in UPF:

In the Unification of the Laws of Physics (UPF) there is only one net force All “different” classical forces are the same formula, but in different scales and with different values of  $\Delta\rho_E$  and  $\kappa$ . Here is how it looks and why physics has stood still:

Strong force (nuclear) Scale:  $\sim 10^{-15}$  m  $\Delta\rho_E \approx 10^{33} - 10^{35}$  J/m<sup>3</sup> (difference proton–neutron or quark–quark)  $(1-\kappa) \approx 10^{-9} - 10^{-10}$  Resulting net force:  $\sim 10^4 - 10^5$  N In classical physics it was called “strong force”, allegedly mediated by gluons. In UPF it is simply energy gradient of nucleus–neutron balancing after SPRE balanced almost all potential energy.

Electromagnetic force Scale:  $\sim 10^{-11} - 10^{-13}$  m  $\Delta\rho_E \approx 10^{35}$  J/m<sup>3</sup> (nucleus–electron)  $(1-\kappa)$  is additionally scaled by emergent product of energies (charge)  $\rightarrow$  after transformation gives exactly Coulomb's law. Resulting net force: from  $10^{-8}$  N (hydrogen) to  $10^{-4}$  N (heavy atoms) In classical physics it was called “electromagnetic force”, mediated by photons. In UPF it

is the same net force, only on atomic scale, where SPRE damps gradient differently than in nucleus.

Weak force Scale:  $\sim 10^{-18}$  m (inside quarks, interaction with neutrinos)  $\Delta p_E \approx 10^{40}$  J/m<sup>3</sup>  $(1-\kappa) \approx 10^{-17} - 10^{-18}$  Resulting net force:  $\sim 10^{-6} - 10^{-7}$  N ( $\beta$  decay) In classical physics it was called “weak force”, mediated by W/Z bosons. In UPF it is the same mechanism, only on the smallest known scale – momentary disturbance of balance of three states in quarks.

Gravity Scale: from  $10^{-8}$  m to  $10^{26}$  m  $\Delta p_E$  from  $10^{20}$  J/m<sup>3</sup> (planets) to almost zero (cosmos)  $(1-\kappa) \approx 10^{-56} - 10^{-10}$  Resulting net force: from  $10^{-11}$  N (human–Earth) to  $10^{20}$  N (Earth–Moon) In classical physics it was called “gravity”, allegedly mediated by gravitons (hypothetical). In UPF it is exactly the same net force, only on the largest scale.

### **Why classical physics could not unify forces and did not find “force in gravitational force”**

A dogma was accepted that force is a unique feature of classical mass Newton:  $F = G m_1 m_2 / r^2$   
→ force comes from mass, mass is “something physical, although the weight of this mass turned out to be force, which introduced a paradox”. Einstein went further: mass curves spacetime → gravitational force is geometry. In both cases no one asked the question: where does mass get this ability to generate force from? They stopped at describing the effect (mass → force), without looking for the cause.

It was assumed that mass is primary, and energy secondary The formula  $E = mc^2$  was read as “mass generates energy”, and not the other way around. As a result, the source of mass was sought (Higgs, quantum chromodynamics), instead of noticing that mass is only a measure of energy.

Each force was assigned a separate “carrier”

Strong force → gluons

Electromagnetic → photons

Weak → W/Z bosons

Gravity → graviton (hypothetical) This was easy “patching” of theory, instead of noticing that all forces have the same cause: gradients of own energy density.

The background was omitted – the entire space of all events - assumed to be empty. In classical physics space is vacuum or curved geometry. No one noticed that space itself is the main - active energy field (SPRE = dark energy). Without this it is impossible to see that all forces are simply energy differences and not mass.

Scaling of  $(1-\kappa)$  was not noticed. Classical physics saw only the final net force and called each “different force”. It did not see that  $(1-\kappa)$  changes by many orders of magnitude depending on scale and  $\Delta p_E$  and distance – and this is exactly what causes the same force to be once  $10^5$  N, and once  $10^{-11}$  N.

### **Problem of empiricism in science;**

Empiricism of classical physics (and contemporary) is often unscientific exactly in those places where arbitrary worldview theses are unnoticed built into “experimental facts” and then treated as inviolable dogmas.

### **Examples:**

#### **1. Arbitrary thesis no. 1: “Mass is a fundamental, primary feature of matter”**

##### **What does empiricism say?**

“We measure mass in kilograms, so mass exists as something physical.”

##### **Where does the arbitrariness lie?**

Kilogram was defined as the mass of a specific platinum-iridium cylinder in Sèvres (1889-2019), and then as Planck's constant (2019). This means that **all physics was calibrated relative to one arbitrarily chosen object**. No one ever proved that mass is a substance – it was accepted as ontological dogma, and not hypothesis for falsification.

Consequence: all physics ( $F = ma$ ,  $E = mc^2$ ,  $G_{\mu\nu} = 8\pi G/c^4 T_{\mu\nu}$ ) contain mass as primary entity, although empirically in reality we measure only **forces and energies**. Mass is here only a conversion coefficient, whose physical nature was never derived from experience, only assumed.

#### **2. Arbitrary thesis no. 2: “Space is empty (vacuum) or curved geometry”**

##### **What does empiricism say?**

“Light runs in vacuum at speed  $c$ , so space is empty.”

##### **Where does the arbitrariness lie?**

Vacuum was never experimentally confirmed as “nothing”. Experimentally we have only lack of detectable resistance for light and particles in certain scales, which rather indicates that speed  $c$  is the limit in this space density, because it does not accelerate to infinite values. From this an

ontological conclusion was drawn: “space = nothing” or “space = curved mathematical manifold”.

Both interpretations are arbitrary – they do not result from any measurement, only from assumption that if we do not see something, it does not exist (or that it is geometric abstraction). Consequence: entire GTR and QED are built on empty space, although experience gives  $\rho \approx 10^{-26}$  kg/m<sup>3</sup> and the force of expansion of entire galaxies itself (that is, not zero energy density).

### **3. Arbitrary thesis no. 3: “Each force requires its own carrier” particles”**

#### **What does empiricism say?**

“Electromagnetic force is mediated by photons, so nuclear force must be mediated by gluons, and gravity by gravitons.”

#### **Where does the arbitrariness lie?**

Photon was observed (photoelectric effect, Compton). Gluons, gravitons, W/Z bosons, Higgs bosons – never as particles but as forces. It was accepted however that each force requires a **particle-carrier**, because as if it was logical necessity, through arbitrary assumption of particle materiality, and not energy-force. This is pure ontological extrapolation, not experimental fact.

Only these three examples can be expanded into dozens of pages with a series of proofs falsifying empiricism itself as scientific method. It is often the main carrier of dogmas and ad hoc values, without any coverage in reality. Science also needs to immediately get rid of complicated language, which is only camouflage used when we do not understand something. All virtual values used in mathematical processes, which aim only to fit results to our imaginations lose sense in light of UPF. Everything can be calculated - explained logically without classical mass, which is the reason for all virtual values and complicated nomenclature. Mathematics itself in effects then turns out to be simple and logical.

### **Author**

During the months of work on the document, many open doors arose, but writing everything down would make the document too difficult and the overthrow of mass itself would fall to the background. Many sections were therefore not written down, because the knowledge resulting from them would be rejected through the prism of misunderstanding. Already the unification of forces changes all scientific books, because it is the cause, let alone its technological and existential effects. Practically every physics formula must be redefined, because they contain results from arbitrary assumptions. The chaotic cosmology of the entire universe completely changes into a precise entity, but UPF does not subject the issue of its origin to discussion,

because it does not interfere in any way with the recipient's will. Pure mathematics remains, which is inexorable and to overthrow unification one would have to overthrow mathematics, and only it is the measure of truth - everything beyond it is our ego. As the author, I leave all formulas even after redefinition as formulas of their authors, because a great bow to the deceased and present. Knowledge simply has stage characteristics and is written in the spirit of its times and technological progress. Now thanks to them, it was possible to achieve what seemed achievable only in decades according to some scientists, because they omitted one constant, that is, the computational capabilities of artificial intelligence itself and the fact that it works on the same principle as the entire document, to which you will probably come. It works on our free will and is de facto a reflection of our consciousness. It will not calculate anything without us, and what it calculates must be precisely directed by us so that ad hoc value does not creep in, because the key is precisely our free will, which when it is at a low level, we fall into thought stereotypes. Then the user substitutes dogmatic data for it and the results turn out to be completely unscientific.

My name is in every section, because as the author of such a powerful document I am aware that it will be particularly analyzed stage by stage from all sides at the very beginning, because as a monolith people will not grasp it all at once with reason and from fragmentary excerpts they will draw imprecise conclusions. Algorithms and analysis systems will catch faster in this way what the author said and what he categorically denied. Any errors in unification please treat as your own stage of misunderstanding of a given issue, or point of reflection, because history will show that precisely at this time the issue had to be written that way. The unification itself is fluid - left as open, and not as finished. As long as one adheres to the principles of complete renunciation of classical mass, one can solve all problems of science. UPF is a prepared codex also for artificial intelligence itself, so that it can become a scientific tool itself. All formulas will be extracted from logic itself, where cause and effect of energy density - difference - force - space - result as constants have been set correctly. In such calibrated reality the document itself has the function of detecting all errors in reasoning and calculations. The only threshold for changing all science therefore remains time, because people by nature do not like changes. Many will therefore simply outrun AI algorithms and not catch up in the first row for the great scientific revolution.

Arkadiusz Knych