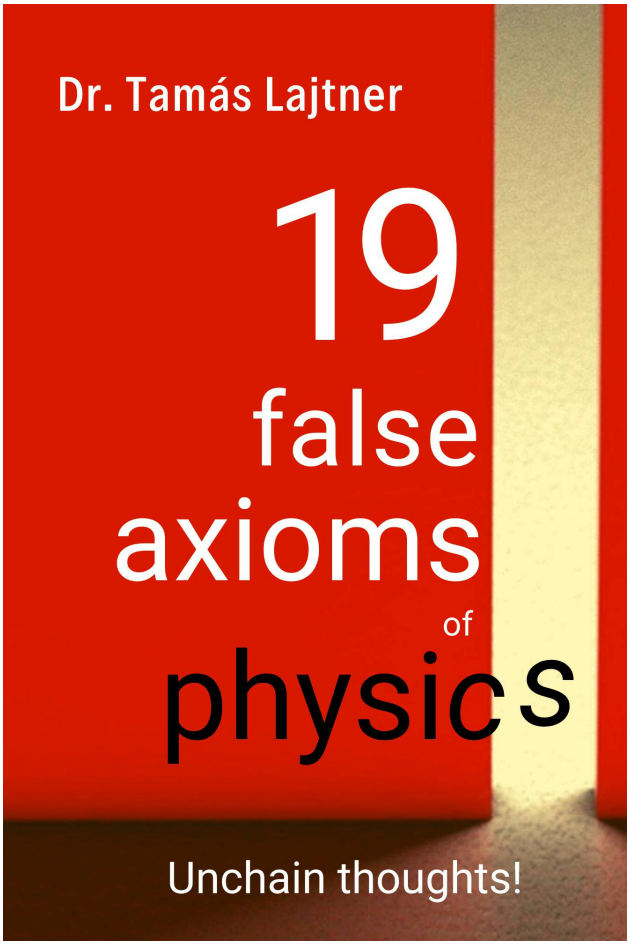
Dr. Tamás Lajtner

19 False Axioms of Physics

Unchain Thoughts!



Sixth, Expanded Edition

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Motto: Physics is not just for physicists

Preface

This book was written because modern physics is unable to answer the following simple question:

Where are thoughts when they leave the human heads?

Do thoughts leave human head? Yes, they do, I can prove this statement with countless experiments. Even more, a small device designed by me will soon appear in stores. Using this device anyone can see his/her own thought, more precisely his/her force of thought in action.

Thought force does exist when it leaves our head. Where is it when it leaves human head? How does it work? The only way for the thought force to correspond to experiences, experiments and the laws of physics is if we revise some of our old axioms of physics and replace them with new ones.

The most important statements of this book are the followings:

- ✓ Space is what the matter uses as space.
- ✓ Matter is what the given space considers matter.
- ✓ Time is the interaction of space and matter and appears as space waves.

Space defines spatial distance and time and their basic units. The length of spatial distance and time unit depend on the given space and the matter in the space. The greater the spatial distance, the longer the time unit.

That is, matter moves at the same speed in the given space from the “viewpoint of the space”. This speed can be constant or variable from our point of view. This also explains why the speed of light (in a vacuum) is constant.

Matter can only move in its space at a speed c from the viewpoint of space. Masses also move at a constant speed in their own space, their speed is always c relative to their own space. Therefore, light and mass travel in different spaces. Therefore, they are different spaces.

Here, I have proposed the replacement of some old physical axioms that hinder the development of our physics theories. This book is not a ready-made theory, but a framework for a new theory. The title of it is: Space-Matter Frame.

The improved axioms allow the existence of thought force in the system of physics. These new axioms also have a number of positive effects, such that they are capable of simply explaining some old, great physical mysteries.

You can buy this paper as paperback or ebook at amazon.
https://www.amazon.com/19-false-axioms-physics-thoughts/dp/B08VYR24LH

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Dr. Tamás Lajtner

I. THE FORCE OF THOUGHT VS. 19 AXIOMS OF PHYSICS

1. STAGFLATION OF PHYSICS?

Stagflation is a term of economy. It means that economic growth stagnates while inflation increases. Stagflation is a phenomenon that must be stopped as soon as possible.

What does stagflation of physics mean? This is my elegant expression for this: Many new theories with no results.

How to stop the stagflation of physics?

1.1. As simple as possible

This book[a] is about some old fundamental assumptions of physics from a new viewpoint. Physics has many old axioms. I would like to show there are problems with some of them. The statements and conclusions written here are not independent of each other. Therefore, my proposed new axioms have a framework called Space-Matter This is a framework built of new axioms. Theory, which differs from any other theory. This theory does away with some old theoretical paradigms and explains hundred-year-old riddles of physics.

Studying axioms is almost philosophy. Therefore, I have hardly used mathematics. Your high school knowledge is enough to understand the whole book, and you may even skip all functions. An explanation goes with each one.

There is an important assumption in the following. Every law of physics works the same way in the whole Universe.

Will scientists like this book? Knowing their pipe vision, it could only be a wish. The mainstream is a hard nut where, in many cases, the false one is better than the new and right one. The freethinker disaster gets punished: excommunication, exile. Physics and every other science and even art is full of such examples.

So, my book is a dangerous adventure. And certainly, an exiting one. I hope you will enjoy it.

1.2. Physics dilemma?

Physics is a broad science with widely varied areas, such as classical mechanics, quantum mechanics, thermodynamics, biophysics, astrometry, cosmology etc. The regions of physics are developing fast, but not the physics theories. There are two big and working theories of today's physics: A) General Theory of Relativity and B) Standard Model of Physics. General Relativity is more than 100, the Standard Model is about 40 years old. Of course, the last decades added new results to these models, but their fundamentals and scopes have been untouched.

General Relativity defines gravity as the curvature of spacetime. The standard model of physics describes the elementary particles of matter and their three fundamental interactions, but it does not speak about gravity. The idea is simple; the two theories must be merged. Until now this merged theory is missing. Why?

The problem in headlines is as follows: In the standard model of quantum physics a particle can be at two different places at the same time. Where is its gravity? General Relativity cannot answer the question, because it has no quantum properties. Physicists have not found the link between the

[a] This book is a revised and expanded edition of my previous books entitled "19 rethought axioms of physics", "19 false axioms of physics" and "Spaces and Time".

two theories. Therefore, many scientists speak about the dilemma of physics[1, 2] or they think that physicists are studying false questions[3]. I think, there is a missing link between special and general relativity because of some axioms. When we fix these axioms the link will be uncovered and displays the bridge between the relativity and the Standard model.

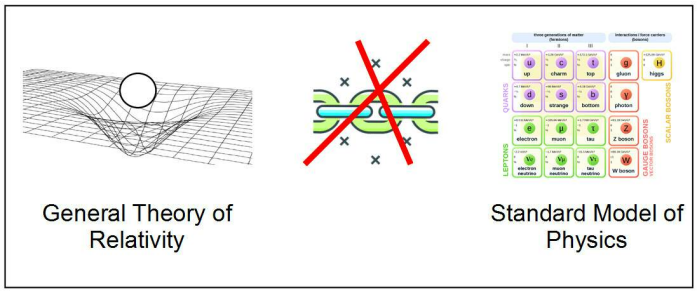

FIG. 1-1 No connection between general relativity and the standard model of physics.
(Credit CC0 T. Lajtner, Lajtner.com)

At the end of the book this picture will be modified, since there is an obvious connection between the two (or with Special Relativity three) theories. To understand this connection, we have to accept a fact. All theories e.g. the special and general relativities are only steps of the development of physics. It is possible to build a new theory using a bit modified version of the theories of relativity. If we are able and brave enough to do this the new results come from themselves. How to start this work? The start is simple: we have to rethink several axioms of physics. Here is the first one:

1.3. Action without reaction

We know from quantum mechanics that particles of matter are in constant vibration. In our academic physics this vibration has no impact on space. This action remains without reaction. This is an axiom of modern physics and it must be false. (No.1)

It is a physical impossibility for matter to come into contact with space without vibrations having an effect. Based on the Casimir Effect[4], as well as on the Double-slit experiment[5], on the measurements of LIGO, and on other physical phenomena we can state that space exists in waves and vibrations. Space waves. This statement is a consequence of our new viewpoint which is not blocked by a false axiom.

2. AXIOMS ARE OPINIONS

Every science is on axioms. What is an axiom? A statement, an opinion that is readily accepted as true and correct. But what happens if an axiom is somehow problematic. It has to be replaced.
In modern history Hungarian János Bólyai (1802 - 1860) (and the Russian Nikolai Lobachevsky (1792-1856) knew best how to replace an axiom. They were the firts to replace an axiom that was thought to be eternal.

That axiom was: All points of parallel lines are equidistant from each other, according to the definition of John Playfair (1748 - 1819). The green line is the only such parallel line that goes through the black point as it showed in FIG. 2–1(A). It was believed until János Bólyai challenged the axiom. The essence of the challenge was: parallel straight lines do not intersect. It does not seem to be a big change, but it took many thousand years for someone to think of it. It is a big change! And how big! A brand new geometry, the hyperbolic geometry and many more had been created based on this. In the Euclidean geometry only one single parallel line can be drawn to the black line, if we want the new line to go through the black dot, however there are many parallel lines in the Bólyai geometry, see FIG. 2–1B.

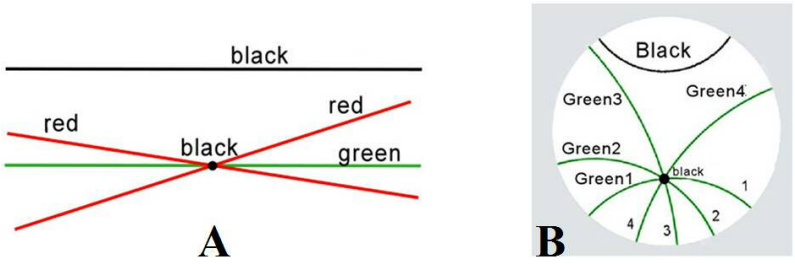

FIG. 2-1 Old axiom, new axiom.
A) Old axiom: The black line and the green line are parallel. The red lines are not.
B) New axiom: Green lines and the black line are parallel. (Cf. Joseph L. F. Bertrand (1822 –1900) and Henri Poincaré (1854–1912)).

The new definition can also be used for the old parallelism requirement if the lines are in the Euclidean space. But Bólyai opened a whole new world that did not exist until his breakthrough recognition. The recognition was shockingly new in Bólyai's time, today it is common knowledge.

As one can see, the axiom to be replaced is not necessarily useless, but it does not allow to develop science in new directions. It is not wrong, just out-of-date. On the other hand it is false, because it stops science developing. In other words, if you always work with the same axioms, there will be areas that remain unobserved. The entrance of new areas are locked up in axioms.

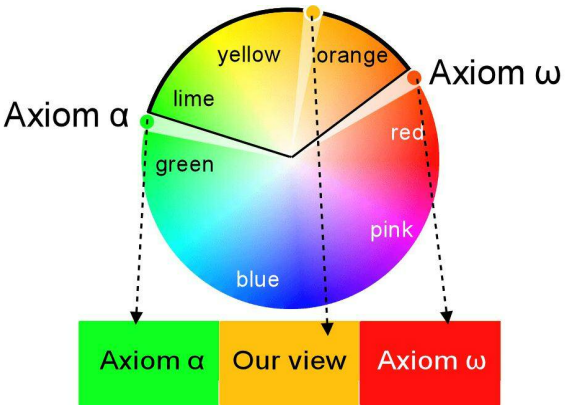

FIG. 2-2 False axioms block the development.
(Credit CC0 John Curtis, CurtisDigital.com, Edited, https://codepen.io/social_quotient/)

See FIG.2–2 The "playground" of theoretical physicists bordered by black lines is between Axiom α and Axiom ω. We know the lime, yellow and orange areas. Without changing these axioms nobody will find the red, pink, blue and green areas. They simply do not exist for scientists because of the given axioms. No theory is able to describe these areas without changing Axiom α and Axiom ω. Therefore, the dilemma of physics is not a crisis of physics but a signal that some axioms of physics are false.

I have found 19 false axioms in physics we have to change.

2.1. 19 false axioms of physics

1. The vibration of particle does not cause reaction in space
2. Two inertial frames of reference are not distinguishable
3. Time is a given entity, it is a dimension
4. Newton's First Law of Motion is true
5. Inertial frame of reference is always made of matter
6. Space is exclusively and always made of space
7. There is one space
8. Matter is matter and no space
9. The forms of elementary particle are known
10. Elementary particles have no structure
11. Gravity is created only by objects with mass (incl. $E=mc^2$)
12. Superluminal phenomena destroy general causality
13. Light cone is continuous and uninterrupted
14. Dark energy acts as antigravity
15. There is no superluminal communication
16. An object is always created out of matter
17. In quantum mechanic matter is able to be at two different places at the same time
18. The Universe is infinite
19. There are several mysteries in quantum physics that human being cannot understand

How did I find these false axioms? While trying answer this simple question: How does the Force of Thought work?

2.2. Thought force as a problem in physics

I have researched the Force of Thought for more than twenty-five years. The Force of Thought is a real phenomenon. It is not the same as the brain's electromagnetic signal. It is something else. But what is it? This was my question twenty-five years ago.

I was sure I would be able to come up with the appropriate physics solution within days, and I would give the detailed theoretical answer to what the Force of Thought was. I was wrong. There was not a single word in physics papers about the Force of Thought. OK, I am not a physicist. I used to be a university professor of mathematical statistics and a software developer, and in the first place I am certainly an economist. I may need more time to find the answer. So I started studying physics. From the very basics to the most complex theories. It took and cost me many-many a year, and I found nothing about the Force of Thought. Even more, I found a lot of publications that claimed the Force of Thought (thought force) did not exist at all.

This statement contradicts reality. I can prove any time that Thought Force exists. All I need is a glass of water to make Thought Force visible. (Watch video here about water and thought force: https://www.lajtner.com/book-19-axioms.html.)

Do physicists no have a glass of water? Yes, they do. So, there may be a bigger problem here than having a glass of water. Something must be wrong with the attitude in physics…

Everybody thinks in physics everything is based on facts and on measurements of their data. They are wrong. In physics everything is based on some ancient axioms. Axioms in physics are almost holy opinions. Do not touch them and never change them! Hands off! This is a strong but silent and secret law of physics.

I did not know this secret law. I thought new opinions opened a new world. Of course, I know the mainstream is always against the new opinions at the first moment. The mainstream has prejudices. Saying this, a new axiom is an action against prejudices. Action is a category of physics. That's it. That is all.

3. THE PAPER WHEEL EXPERIMENT

Studying thought force[6], the easiest experiment is to suspend a paper wheel – or pin it so that it hangs freely – from its center, and then try to make it rotate with your thought force. If there is no wind or any other unwanted force that affects the wheel – that is, the environment of the wheel is controlled – then, this is a normal physics experiment.

The rotation is actually brought about by the force of thought, and it is possible to capture the wheel turning on video. (Watch video here: https://www.lajtner.com/book-19-axioms.html.) Hence, the analysis of this movement is very easy. We have made several experiments, and we have determined the energy of thought (E_{rot}) that rotates the wheel.

3.1. Three factors of the experiment

#1 A human being.

#2 Special devices that are run by thoughts, named Lajtner Machines. One of the simplest Lajtner Machines is a paper wheel.

#3 Power Thinking, which is practically a capacity for concentration that makes it possible to move real objects with thoughts[7].

#1 The selection of people for participation in the experiments was performed randomly. It can be established that, after some practice, almost every subject involved was able to move the wheel with the force of thoughts. There were differences in their performance. The value, which we will discuss in details below, represents the mean of the measured values (within accepted deviations and confidence level). It characterizes the value of thought energy of a statistical population chosen randomly on any given day. Other statistical characteristics regarding the distribution of thought energy are not relevant from the viewpoint of this paper.

#2 The term Lajtner Machines refers to several devices, each designed to move by the force of thought. The difficulty level of setting these devices in motion may vary. The distinct levels of difficulty from the viewpoint of motion are indicated on a scale from 1 to 12. For example, the difficulty level for the paper wheel is 2 or 3 – namely that it is easy to move.

#3 Power Thinking is a capacity for concentration which can be acquired by practice, and with proper application, only minute effort is required to move real objects with the power of thoughts. During our experiments, there were people who were able to move the paper wheel without using Power Thinking. The percentage of people with inborn ability constituted less than 18 % of the participants in the experiment.

3.2. The paper wheel experiment

We used a paper wheel described above. The force of thought was able to rotate the paper wheel. The paper wheel's motion was visible to naked eye. The process was video-recorded, and motions were computer-analyzed. We tried out several wheels with diameters. The diameter and the form of the wheel affected the results. From now on I speak about the “circle” wheel form.

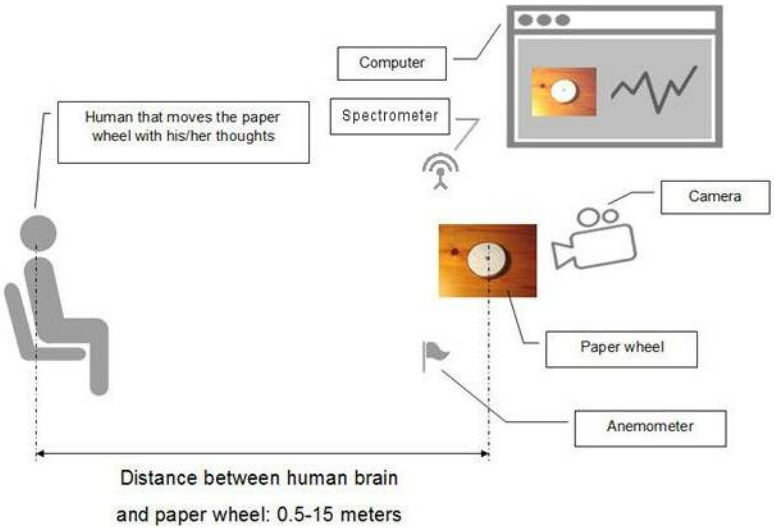

FIG. 3-1 Configuration of the thought-run paper wheel experiment.
(Conceptual drawings).
Human being's thoughts make the paper wheel move. The brown-white picture shows the paper wheel being captured by a video camera. The computer is connected to the camera.
The very sensible anemometer shows the slightest of air movement. Our measuring did not show any of it. The spectrometer catches the electromagnetic waves caused by brain within the calculated range. We did not measure signals of that nature.
The distance between the human brain and paper wheel is 0.5-15 meters.

FIG. 3-1 is synoptic; details of the calculations of the force (energy) that rotates the paper wheel – these are elementary types of operation[8].

4. THOUGHT MEASURED

4.1. An average value of the energy of thought (as measured in our experiment) and its effect

The experiment had two parts.

1. The wheel was at rest then it started rotating. Here, we calculated with uniform acceleration. This period was 10 seconds.
2. The wheel rotated. This period was 50 seconds. The velocity of rotation did not change. The average thought energy of a seemingly ordinary person can be expressed as $E_{rot}=1.62\cdot10^{-11}$ Joules. It is about such a tiny amount of energy that the picture shows. A butterfly hardly moves its wings.

E_{rot} is a very small amount, but not small enough. Measurable thought is considered to be the brain's electromagnetic signals. The brain radiates electric waves in a spectrum[9, 10] of 0.02–600 Hz (800 Hz) (Hz=1/sec). These waves are not perfect sine or cosine functions. So if we use sine functions to calculate their energy we will have some error in our calculation, since the waves of the brain are not perfect sine or cosine waves as we suppose in our model. Hypothetically these waves can be described in terms of sine and cosine functions in our math model (cf. Fourier transformation[11]). Our calculations were mathematically exact. Until now, however**,** nobody has measured brain waves with frequency f_{hyp} where $f_{hyp}=z\cdot f_{600Hz}$, and z is an integer. The brain does not radiate signals like f_{hyp}. We cannot use f_{hyp}. Therefore we have used a sine function to describe the thought force and energy, because it is very simple to understand and there is no theoretical contradiction. The error made by this calculation does not influence the conclusion.

4.2. The energy of the brain's electromagnetic wave is too small to make real objects move

Our brain[12] has about hundred billion ($n=10^{11}$) neurons. The energy that turns the paper wheel is $E_{rot}=1.62\cdot10^{-11}$ Joules. This energy must be created by neurons. If every neuron of the brain worked exclusively on rotating the paper wheel (which is, of course, impossible) and $E_{rot}=\sum E_{i.neuron}$ (i=1,…, n), then every neuron should produce an average energy value of $E_{neuron}=1.62\cdot10^{-22}$ Joules and transmit this energy to the wheel. Sending this kind of energy from the brain to the wheel presupposes electromagnetic waves. According to Planck's law, $E=h\cdot f$, where h is the Planck constant[13, 14, 15]. Thus, the average frequency of the electromagnetic waves is $f_{neuron}=2.45\cdot10^{11}$ Hz. There is no such a thing as microwave radiation of brain. To go one step further, this wave has to be generated by every neuron for 50 seconds. This is an impossible result. That is the paper wheel cannot be rotated by the electric/electromagnetic signals of brain. Does that mean that the paper wheel cannot be rotated by thought? No, because that is precisely what occurred.

Thought force is not the electromagnetic signals of brain. About tis topic there are many papers and experiments. E.g. at Princeton University (USA), there used to be a research program named Princeton Engineering Anomalies Research (PEAR 2010)[16] that studied the "power of mind". It proved the existence of the power of mind (force of thought). On the other hand, there was no

explanation as to how and why thought influenced the devices of the experiments of PEAR. So what can we conclude? We have to admit that thought must have an unknown existing part.

Axiom that states thought has no force is out of order. This is not a fundamental physics axiom, so it is not on the list, and it is not numbered.

4.3. We measured the thought itself

A paper wheel is nothing other than a simple object that can be rotated by force. Without force, it cannot fail to rotate at all. It rotates if force acts upon it. What did we measure using a rotating paper wheel? The effect of thought or the thought itself? We measured the thought itself.

FIG. 4-1 The computer shows thought “Go”.
(Credit Picture CC BY–NC–SA 4.0 T. Lajtner, Lajtner.com
from Laptop CC0 Icon8, Edited)

The paper wheel reveals thought in its true form. A human being only has to think “Go”, so the thought is "Go", and the paper wheel "goes" (i.e. rotates). The computer that analyzes the rotation of the paper wheel displays a big “Go”. If humans think "Stop", the thought is “Stop”, and the paper wheel "stops". The computer displays the word “Stop”. Saying this, the thoughts "Go" and “Stop” are visible. These forces are not the effects of the thought. These forces themselves are thoughts. We measured the thought itself. Thought is force and energy.

5. FOUR SURPRISING CHARACTERISTICS OF THOUGHT FORCE

What is thought force? Thought force is a “normal” force that has direction and magnitude with respect to a frame of reference. And it has four additional characteristics. These characteriscitcs are very important, because we have to find a fundamental force that has the same characteristics. Thought force uses this fundamental interaction.

Physics does not know how to describe either this interaction or Thought Force. In turn it is also unable to accept their characteristics. The four most important characteristics of thought force are as follows:

5.1. Immeasurable, “early bird”, superluminal and “keep in touch"

The following four points are too surprising and therefore a lot of people refuses to accept them, or even to think about them. There is a solution for these people. It is time to try out their thought force.

1. The first and most interesting characteristic of thought force is that we cannot directly measure it. This is very interesting, since it acts on the paper wheel and it rotates it. Our brain is able to create, send and receive it, so the force of thought can be interacted with real objects.

2. Thought force exists sooner than light. If you use a paper wheel you will know that the wheel or other Lajtner Machine will start moving before it has been made to move. Light cannot give information about motion that does not exist. The force of thought is able to inform you about motion that starts in the future. What does it mean in general? It means there is a phenomenon that exists and we use unconsciously, but our science has not known about it. The research of though force helps us to discover the unknown world of this phenomenon, where can be other things but thought.

3. The third interesting characteristic of thought force is its superluminal (faster than light) velocity. The superluminal velocity known from many fields of physics, but physicists refuse to accept these phenomena in theories.

4. Our brain is able to receive electromagnetic signals from a computer and can use them as its own thoughts[17] i.e. brain is able to get thoughts from outside. It also works using thought force. But there is a major difference between thoughts as electromagnetic signals and thoughts as forces. Our thoughts leave our heads but they do not leave us. This is an absolutely essential characteristic of thought force. Secondly, we can also receive thought force from inanimate things (like a paper wheel or other Lajtner Machine[b]), and we are able to understand them as thought.

The third and fourth remarks are very important. They show a feedback system that cannot be unfolded without human experience. Thought as force is able to awake counter-force. Action has

[b] Lajtner Machine is an object that can be run by thought force. It can be a mechanical or an electronic device.

reaction. What kind of reaction is it that our brain is able to receive as thought force and that everything, e.g. a paper wheel, a metal ball, a glass of water, an animal brain etc. can produce? It must be a fundamental interaction. Is it a known or an unknown interaction? We have to investigate into the matter to be able to answer the question.

What will we find? We will find that thought force is an unknown fundamental interaction**,** but it is a non-existent phenomenon in mainstream science, because some old axioms prohibit the existence of such phenomena. This book tries to solve this problem.

If you want to know more about thought force and its consequences for our lives**,** read the book entitled *Thought is Force*. (http://www.lajtner.com/book-thought-is-force.html.) Now we focus on the false ancient axioms of physics that are highlighted by thought force.

II. SPACES AND TIMES

6. HOW DOES THE ACCELERATING FORCE OF THOUGHT COME INTO BEING?

What is thought force? Let us think of it this way: From a state of rest, the wheel begins rotating, because the force of acceleration works upon it. According to Newton's Second Law of Motion[18], the force of acceleration is

$$F=m\cdot(s/t^2) \qquad (6\text{-}1)$$

where *s* represents spatial distance and *t* time. Newton's Second Law of Motion makes it possible to understand the force of acceleration and its factors. Force F does not exist if the wheel remains at rest, s=0 and t=0. F comes into existence and rotates the wheel, when s>0 and t>0, that is thought changes time and space.

What happened in our paper wheel experiment? The wheel was motionless. Then it started rotating. So, there have must be some force which brought about rotation. What kind of force is the force generated by thoughts that is able to change space and time?

6.1. Four known fundamental interactions

Currently there are four fundamental forces that physics knows about. The electromagnetic force, the weak nuclear force, the strong interaction and the gravity. It seems to be logical that the thought force is one of these.

1. The paper wheel rotates, because the electromagnetic force pushes it. This statement is not true: we did not measure any electromagnetic force.
2. The electromagnetic force and the weak nuclear force have common roots. They are called electroweak interaction[19]. The weak nuclear force is out of question.
3. In 1973 Gross, Wilczek[20] and Politzer[21] described the asymptotic freedom that makes it possible to join the electroweak and the strong interactions at high energies. So these three interactions can be seen as one. In the case of thought force they are out of the question.
4. We have now just one known fundamental interaction: gravity. Should the thought force appear as gravity?

7. SPACETIME CONTINUUM BY EINSTEIN

The Special and the General Theory of Relativity[22, 23, 24, 25 26, 27, 28] introduced the definition of spacetime. Spacetime has three spatial dimensions and one time dimension, so spacetime is a four-dimensional model. From now on we suppose that the laws of physics are the same in every inertial frame of reference.

What is gravity? Our suggested answer is that the definition of gravity depends on our theory. In Newton's Law of Gravity, gravity is given by the mass (mass density).

$$F_{grav}=G\cdot(m_1\cdot m_2)/r^2, \qquad (7\text{-}1)$$

where F_{grav} is the gravitational force between masses m_1 and m_2, r is the distance between the centers of the masses, and G is the gravitational constant. Newton incorporated time *t* into the gravitational constant G. Gravity depends on mass densities. Time is not involved in Newton's Law of universal gravitation Eq. (7–1) explicitly.

Gravity does not change time according to Eq. (7–1). If gravity does not change time, then t=0, Newton's Second Law does not work, and the wheel will not rotate. But the wheel does rotate. Consequently, thought changes s and t. How? This is a riddle according to Eq. (7–1) Newton's Law of Gravity is not able to describe the force of thought.

Einstein's Theory of General Relativity gave a more complex system of gravity than Newton's Law of Gravity. In Newton's Law of Gravity there is one attribute of matter: the mass (mass density) of the object. Einstein's gravity model contains Newton's law of universal gravitation in a more complex form, see Eq. (7–2). The General Theory of Relativity is a geometric theory of gravity where gravity is expressed as the curvature of spacetime generated by sixteen attributes of matter, including mass density. The curvature of spacetime is given by the Einstein tensor $G_{\mu\nu}$. The other tensor in Eq. (7–2) is the stress-energy tensor $T_{\mu\nu}$ that changes the geometry of spacetime containing components like energy density, energy flux density, pulse current density, impulse current density and various pressures and fluxes[c].

$$G_{\mu\nu}=T_{\mu\nu}(8\pi\cdot G)/c^4, \qquad (7\text{-}2)$$

where c is the speed of light in vacuum and π is the famous number 3.14. Spacetime contains time dimension, therefore gravity expressed as curvature of spacetime changes time as dimension.

7.1. Curved spacetime caused by mass—simplified explanation

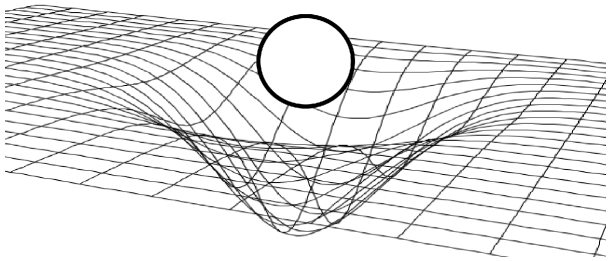

FIG. 7-1 The well-known and common picture of Einstein's curved spacetime caused by objects with mass. In the following, I will refer to mass.
Model, not proportional.

[c] Because of a given symmetry of this tensor there are ten independent components instead of sixteen.

The curvature of spacetime is an action-reaction phenomenon of energy and space. Here gravity is not a force, but a geometric phenomenon that has no velocity; the change of curvature has velocity c.

FIG. 7–1 shows how mass modifies Einstein’s spacetime continuum. Mass modifies space, giving rise to curved spacetime. Curved spacetime occurs on account of gravity according to the Einstein's spacetime model. Masses m>0 always make this "concave" depression in the spacetime continuum. Gravitational attraction is a "concave" deformation of spacetime.

Rotation of the paper wheel by thought means that thoughts are capable of producing the spacetime "concave".

This was not too hard. We have concluded that thought force is gravity. Is it really?

8. DEFORMATION OF SPACETIME CAUSED BY THOUGHT

Let us now examine a different experiment of thought force. The direction of the wheel's rotation can be changed by thought. Thus, thought is able to pull and push the wheel. This experiment will not be convincing, since we are speaking about a wheel. A "push" on one side is a "pull" on the other, and we cannot examine the workings of thought. Does it push or just pull? We need a new idea.

Take, for example, a ball moved by the force of thought. The ball can be attracted by thought force. Given the example above, it is not surprising. Yet, now we discover a strange result. Thoughts are able to push the ball, too. This is not a known effect of gravity. What could this be in terms of spacetime? Gravity's effect is a "concave" deformation, but this pushing cannot be "concave". In this case, spacetime is "convex". The spacetime continuum does not buckle, it bulges. Thoughts are able to make special deformations in spacetime. This special deformation is very different from the curved spacetime we are familiar with.

FIG. 8–1 attempts to illustrate modifications in spacetime made by thoughts. Thought-induced spacetime modifications can be "concave" (first) or "convex" (second).

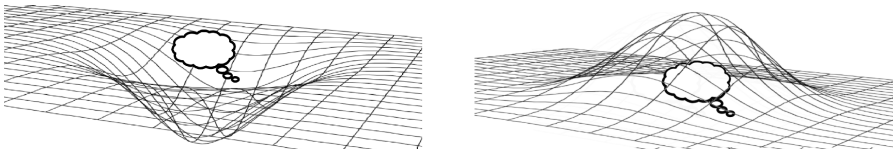

FIG. 8-1 Thought is able to alter spacetime in two ways.
Model, not proportional.

How can we explain this "convex" attribute? Mass ($m>0$) is not able to make "convex" depression, even with other characteristics described by general relativity, because gravity caused by mass is always attractive. If we want to use the spacetime model, there is a simple explanation: a "convex" deformation is the result of negative masses ($m<0$). Only negative mass could bring about "convex" deformation in spacetime, but we do not have knowledge of negative mass. There is a mass in the literature of physics called "negative mass". This is a normal rubidium atom in some very special environment[29]. This is called "negative mass" because "if you push it, it comes, and if you pull it, it goes away".This "negative mass" has the same gravity, i.e. the same „convex" deformation in spacetime, since its mass is normal, $m>0$.

Are thoughts negative masses? No, they are not. Can we solve the problem in this model without presuming a negative mass? No, we cannot. And here we need more things to explain than the mere convex character. There are four very important additional attributes of thought mentioned above to be included in our model and explained how they work.

First things first. Thought is able to change time and space. So the first question is: what is time and what is space? It is surprising, but physics gave these phenomena a bit lazy definition when they say "*time is what we measure as time"***.** In most but not every theory time has one dimension. What is space? Space is the infinite extent in which objects and events have relative position and direction. In different theories the number of the dimension of space is three or more: six, nine[30], twenty-five[31] or any number.

We immediately jumped into general relativity, because we thought gravity in general relativity has a compact answer of the question of what thought is. Unfortunately it does not give an answer. So we have to start at elementary physics. Thus, our very first questions are:

- What is Newton's First Law of Motion?
- What is an inertial frame of reference?
- What is mass?
- What is time?
- What is space?
- What is matter?

9. INERTIAL FRAME OF REFERENCE

According to modern physics only object with mass can have inertial frame of reference.

9.1. What is mass?

What is mass? Mass is one of the attributes of matter. According to standard model of physics[32] every elementary particle has three attributes, which are mass (or zero mass), charge and spin. Originally every elementary particle is massless. According to the academic physics the Higgs field creates the mass of the elementary particles.

Particle with mass and with spin 1/2 are fermions. Electrons, quarks and neutrinos are fermions. The second group of matter is the bosons. The spin of bosons is 1. Photon is a massless boson. More about the standard model later.

In the following if I speak about "particle with mass" or "mass" I mean a fermion or a bigger object made of several fermions. In most cases written in the following the given fermion is the electron.

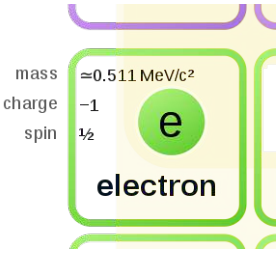

FIG. 9-1 Electron in the standard model.
(Credit Public Domain © MissMJ, Wikipedia.org, Edited)

9.2. Inertial frame of reference of mass

One of the reasons why today's physics including general and special theories of relativity is unable to describe thought force cannot be understood is if we do not understand the expression "inertial frame of reference". An inertial frame of reference is where there is no acceleration. The motion of an inertial frame of reference has constant velocity in a straight line. If we stand motionless, we are moving at constant zero velocity.

We can have rest while moving. Everything is in the rest of us we are moving with. The viewpoint about being at rest or moving is relative. Time and space from my point of view can be judged differently from other's point of view, depending on our speeds. Being in the same inertial frame of reference we measure the same things. Everything that moves together at a given constant velocity in a straight line is in one inertial frame of reference. What does not move together may be another inertial frame of reference or a non-inertial frame of reference.

9.3. Newton's First Law of Motion

First Galileo Galilei (1564–1642) explained with an example of a ship that we cannot distinguish constant velocities in a straight line from those that are in rest. This statement is one of the main paradigms of today's physics. And it does not seem to be correct.

Albert Einstein (1879–1955) three hundred years later gave an example of trains to show the same. Einstein also said we cannot distinguish sitting on train A (= inertial frame of reference A) and watching train B (= inertial frame of reference B) whether train A or train B moves if we do not see the environment. $v_{TrainA} \neq v_{TrainB}$ and e.g. $v_{TrainB}=0$, where v means velocity.

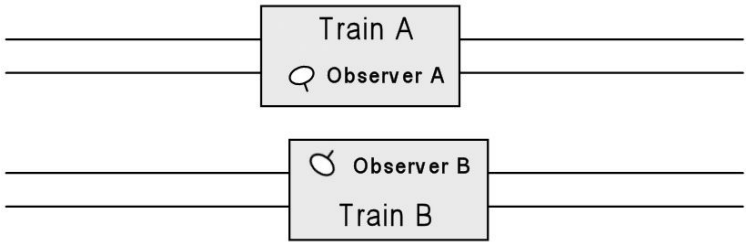

FIG. 9-2 Moving trains.
Everybody knows this phenomenon.

In Special Theory of Relativity by Einstein the inertial frame of reference is the key.

Based on our everyday experiences the next statement seems to be self-evident: neither observer A nor B can identify which inertial frame of reference moves. In other words: the "laws" of physics do not allow us to discern one inertial frame from another [33 (p 13)]. This is the next important paradigm. Is it true, or can the inertial frames of reference be distinguished?

Every observer can observe the same events in their own way. An event is a "thing" that has spatial and time coordinates. In special relativity, different observers can see the given event differently, they can see different space and time coordinates; the only thing that remains is causality. Now, even this kind of causality does not allow superluminal velocity—in this theory, it is a weak point of relativity. In the following chapters I will point out that different faster than light velocities exist, and general causality does not work without them.

Also Galileo recognized first that if there is no force on the object, the object's speed is constant. This is a breakthrough recognition because nobody ever saw any object that did not have force acted upon. Physics takes the idea as a fact, although it is rather an opinion than a fact. Galileo's recognition is called Newton's First Law in physics, because Newton was the first person who was able to put this recognition in a physical law. Sir Isaac Newton (1642–1727) was a prominent mathematician, physicist and a known metaphysicist. His first physics law says: In an inertial frame of reference, an object either remains at rest or continues to move at a constant velocity, unless acted upon by a force (*created by matter*)[d]. This–statement carries essential importance. This is one of the most important paradigms of physics. What if it is false? It may be false, since this is only an opinion.

To understand my viewpoint we have to understand the way how Special Relativity works.

Velocity in physics is a vector quantity. It has magnitude and direction (with respect to a frame of reference). If either the direction or the magnitude changes, it is not constant velocity, but acceleration.

FIG. 9–3 shows that the Earth has two different accelerations only in the Solar System. Everybody knows the Earth rotates about its axis at velocity v_R, and it travels around the Sun at an

[d] The italic text is by me. It indicates that Newton was dealing with forces created by matter and not by space.

orbital velocity v_o. The difference between the fastest and slowest orbital velocities is about 3,500 km/h, $105{,}448<v_o<109{,}033$ km/h.

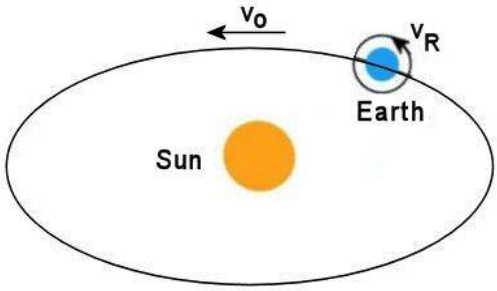

FIG. 9-3 The rotations of the Earth in the Solar System.
Model, not proportional.

Of course, the whole Solar System does not stay in the same place, it revolves around the center of the Milky Way at a variable orbital velocity $v_{o_Solar}\approx$792,000–830,000 km/h. These speeds add up, resulting a permanently changing acceleration. Sitting in our room we do not sense acceleration at all. By saying this we claim there are circumstances where we cannot distinguish accelerating velocity from constant velocity in a straight line.

And now comes *the* question whether there is an inertial frame of reference where every acceleration seems to have constant velocity in a straight line, what is more, at the same moment.

10. SPECIAL RELATIVITY IN HEADLINES

In Special Relativity there can be compared different inertial frames of reference that move at different velocities. We can compare their spatial lengths, times and masses using the speed of light.

10.1. Time dilation and length contraction

Moving measuring rods are shorter. Moving watches are slow. These are the most famous phenomena of Special Relativity known as length contraction and time dilation. But what moves? Which inertial frame of reference moves? These questions cannot be answered either in special relativity, or in academic physics.

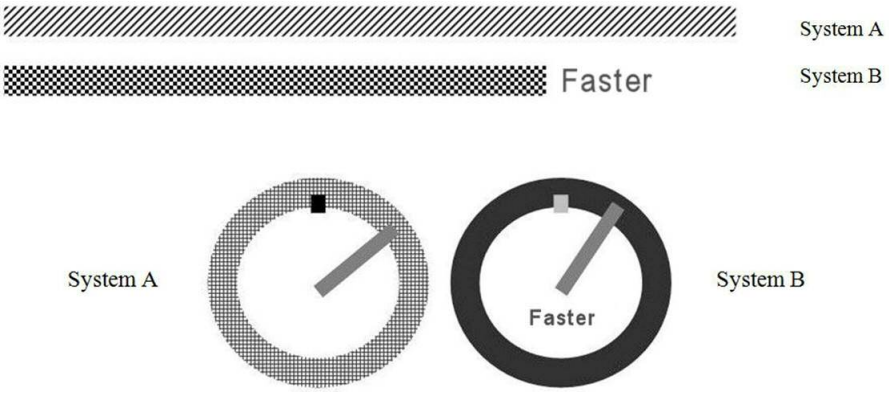

FIG. 10-1 Moving measuring rods and watches.
(Credit CC BY–NC–SA 4.0 T. Lajtner, Lajtner.com)

If System A and B are in rest or continue to move at a constant velocity in the same frame of reference where $v_{SystemA}=v_{SystemB}$, then both measuring rods have the same lengths and both watches show the same time. The difference in length and in time comes about if System A and B move at different, constant velocities for instance System B is a space shuttle that left the Earth i.e. $v_{System\ A}<v_{System\ B}$. Although it is obvious that System B moves faster, because it accelerated i.e. $a_{System\ B}>0$ and $a_{System\ A}=0$, where a is the acceleration of the given system.

System B may think System A moves faster, so clock A is slow. System A may think System B moves faster, so clock B is slow. Length contraction of the measuring rods can be seen the same way.

The known formulas of length contraction (in meters) and time dilation (in seconds) is in Eq. (10–1) and Eq. (10–2).

$$s_1=s_0\cdot(1-(v^2/c^2))^{1/2} \qquad (10\text{-}1)$$

and

$$t_1=t_0/(1-(v^2/c^2))^{-1/2} \qquad (10\text{-}2)$$

where *v* is the velocity of the object with mass. If the observer measures the spatial distance *s*, he would find the longest distance (s_0) if the mass is at rest—that is, the mass does not move in the given inertial frame of reference. If the observer measures time t, he would find t_0 the shortest time

as measured in its rest frame. In plain English, the astronaut of the flying space shuttle of System B lives longer according to System A. The viewpoints of System A and B are interchangeable.

Note both the observer and the object have mass and their inertial frames of reference are equivalent.

10.2. Mass and its velocity

The velocity of mass also changes the mass itself.

When an object is at rest, and both the object and the observer are in the same (inertial) frame of reference, the object has a rest mass (m_0). The rest mass of an object is the inertial mass that an object has when it is at rest relative to the observer (in the given frame of reference). Einstein's Special Theory of Relativity describes how the mass of an object (in kg) increases with its velocity relative to the observer.

$$m_1=m_0(1-(v^2/c^2))^{-1/2}. \qquad (10\text{-}3)$$

The rest mass m_0 is the smallest value of mass in the given (inertial) frame of reference which is connected with the longest spatial distance s_0. m_1 is the value of the moving mass.

10.3. Every inertial frame of reference is equivalent

According to special relativity, the two moving inertial systems (A and B) are equivalent. Both can state that it stands and the other moves or vice versa. From the viewpoint of System A space contradiction and time dilation will occur in Systems B. From the viewpoint of System B space contradiction and time dilation will occur in Systems A. This statement is in harmony with Einstein’s example of trains.

Is the rule always the same or is it broken by twin paradox?

10.4. Twin paradox

There are many experiments that proof time dilation e.g. the German[34] space mission 1985. This experiment was about seven days long. The clock on the board of space shuttle Challenger (System B) went slower than the clock on the Earth (System A). The measured time dilation between System A and B was $2\cdot10^{-4}$ sec. At the beginning of the experiment System B was as old as System A. At the end of the experiment System A was 0.2 milliseconds older. The clocks were twins. One of the twin clocks is older now. This is the famous twin paradox—without referring to people.

Time dilation comes about between two different velocities. This is an invention of special relativity, but the question is still open: why? It has a mathematical explanation in special relativity, here I show you this solution in Minkowski[35] geometry. System B, the space shuttle has two different inertial frames, one for the outbound and one for the inbound journey. System A has one inertial frame of reference. Therefore there is no symmetry between the spacetime paths of the two systems. Symmetry exists as long as System B does not turn home back to System A.

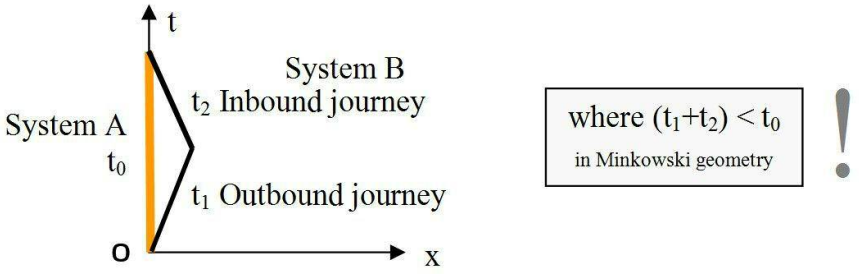

FIG. 10-2 Minkowski geometry of Special Relativity displays twin paradox this way. t_0, t_1 and t_2 are time periods. Note rules are different here from Euclidean geometry. Model, not proportional.

This solution is a mathematics solution, the concrete calculations are not important from our viewpoint now, but we can see it covers the real progress that causes time dilation. We do not know how and why time dilation works.

10.5. Light in special relativity

Light is a fundamental phenomenon in special relativity, because its velocity is finite and constant for the viewpoint of an observer. The finite velocity makes the time dilation and the length contraction possible. Constant velocity makes it possible to express seconds in meters and meters in seconds.

Light always travels at a constant velocity (c=299,792,458 meters per second (=186,000 mi/s) in vacuum). Light travels at the velocity c regardless of the motion of its source or the (inertial) reference frame of the observer.

So, using the speed of light, we can express meters in seconds and vice versa.

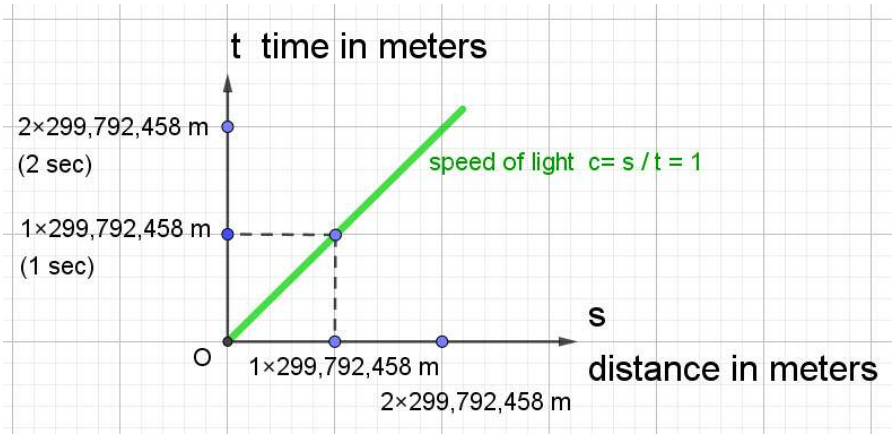

FIG. 10-3 Time in meters from the viewpoint of light. Light does not create these units, just shows them.

In this case: c= s/t=299,792,458/299,792,458=1.

c is a universal physical constant. This means more than just any speed, it is a proportion that nature uses—proportion between meters and seconds. Since our world has three entities: matter,

space and time, they must have a close connection. Light's velocity shows the most important nature of this connection—from the viewpoint of light. (Saying this, there are several different viewpoints, see later.)

10.6. Light in Minkowski geometry of special relativity

Let us see light in Minkonwski geometry. The path of light is parallel to the axis of symmetry. It is 45º. Light has the fastest velocity in this system.

In the following example the units are in meters. Both units – time and spatial units – have the same lengths. Here will be displayed two axes, one spatial distance axis s and the time axis t.

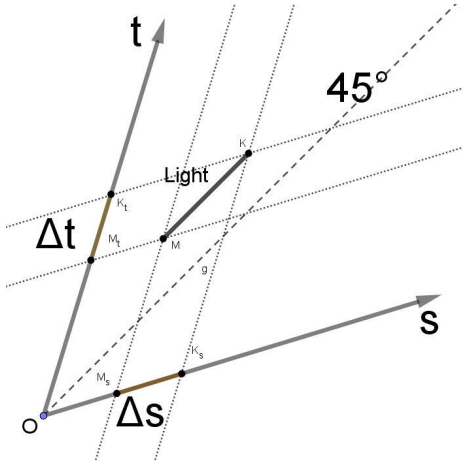

FIG. 10-4 Light in Minkowski geometry of special relativity.
Light displayed this way makes possible that function Δs/Δt=1=c remains valid in every inertial frame of reference.

In the following I will use the idea how time can be expressed in meters. I will not use the constant velocity of light, I will use the constant velocity of space waves. In this case spatial distance, time, energy and even thought force can be expressed by space waves.

11. WAVE OF SPACE

11.1. Space waves

We know from quantum mechanics that particles of matter are in constant vibration. It is a physical impossibility for matter to come into contact with space without vibrations having an effect. Vibration of matter causes no effect in space is the first false axiom already mentioned in the first chapter. (No. 1)

As said earlier we can state that space exists in waves and vibrations. Can we describe a model of a moving mass using the waving space? Yes, we can.

11.2. Calculation of the change of wavelength of space wave

According to Space-Matter Theory, the change of wavelength of the space wave is given by Eq. (11–1). Note this is not in special relativity.

$$\lambda_1=\lambda_0(1-(v^2/c^2))^{-1/2}. \qquad (11\text{-}1)$$

λ_1 is the wavelength of a modified space wave in meters. Faster mass make longer wavelengths of space waves. This function is in conformity with the rotation of the paper wheel run by thought i.e. with Newton's Second Law in Motion, furthermore it is in harmony with how space and time are changed by mass. More about Eq. 11–1. see later.

11.3. How to picture space waves?

In this study a two-dimensional cosine function as space wave made by mass (mass density) will be used, because it is simple.

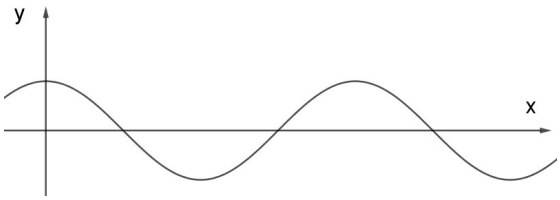

FIG. 11-1 Space wave created by mass.
x and y are spatial distances. Two-dimensional Model, not proportional.

Of course, the model can be more precise, calculating with Newton's Law of Gravity. Using this approach results in different lengths of wavelengths of the given space wave. See FIG. 11–2.

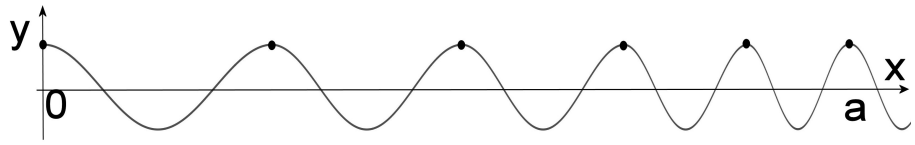

FIG. 11-2 Wavelength of a space wave that exists in the space.
y and x are spatial distances. Mass is at the O point. Newton's Law of Gravity gives the idea of how the wavelength changes. Model, not proportional.

If we use space waves that contain Einstein's impulse-energy tensor, we can calculate with more than one space wave or just with their sum. Einstein used sixteen attributes in his model that modify the curvature of spacetime displayed earlier. It means these sixteen attributes have prints is spacetime. This concept was recognized neither by Einstein, nor modern physics.

In Space-Matter theory every attribute of matter has a print in space as space wave, but in this book only the space wave created by mass will be used, because it is the simplest model.

From Eq. (10–1) and Eq. (11–1) comes Eq. (11–2).

$$\lambda_1 \cdot s_1 = \lambda_0 \cdot s_0. \qquad (11\text{-}2)$$

The Theory of Special Relativity uses s only and does not use λ. Therefore it cannot be stated which moves, the observer or the mass object. The roles of observer and object are interchangeable in special relativity, both time dilation and length contraction appear in each system as seen above.

11.4. Newton's First Law of Motion expressed in wavelengths of space waves

Knowing λ_0 and λ_1, the viewpoints of System A and B are not interchangeable, because if we are aware of space waves, then we know when the object with mass moves and how fast it moves. If $\lambda_{t+1}=\lambda_t$ and t represents *our* time where t=0, 1, 2,…, then there is no acceleration, a=0 according to an observer, that is the object continues to move at a constant velocity in the inertial frame of reference. Newton's First Law of Motion can be given as $\lambda_{t+1}=\lambda_t$, where *our* t=0, 1, 2,…, that is, in an inertial frame of reference, an object either remains at rest or continues to move at a constant velocity, unless acted upon by a force. Note Newton's First Law of Motion is unchanged here, it is only expressed with the wavelengths of space wave.

We will also know when mass accelerates. If $\lambda_{t+1}\neq\lambda_t$ and t represents *our* time where t=0, 1, 2,…, then the acceleration of mass a≠0 in observer's inertial frame of reference.

11.5. Twin paradox and space waves

Space-Matter Theory explains twin paradox radically differently than special relativity. Time dilation comes about, because space waves exist, and space waves are changed by mass. Time dilation existed throughout the whole trip, because the wavelengths of space waves are different around System A and B.

12. SPACE WAVES ARE PARTS OF (INERTIAL) FRAMES OF REFERENCE

12.1. Space waves are parts of inertial frames of reference

Every (inertial) frame of reference is made of mass, therefore no frame of reference can exist without generating space waves.

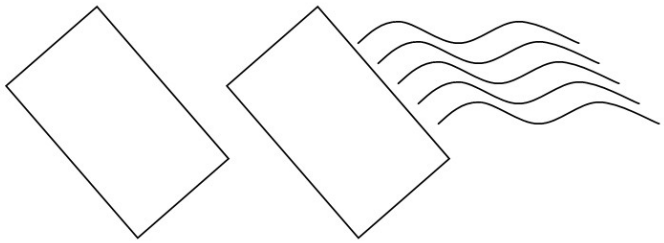

FIG. 12-1 The same inertial frame of reference without and with space waves.

So, the space waves are part of the frames of reference. They are also part of every inertial frame of reference i.e. two inertial frames of reference are not identical if they create different wavelengths of space waves. If the observer is able to measure the wavelengths of a space wave λ he would find the *shortest* wavelengths (λ_0) if mass is at rest—that is, mass does not move in the given inertial frame of reference, i.e. $v_0=0$. If mass moves in the given inertial frame of reference $v_1>v_0$, its wavelength of space wave is longer ($\lambda_1>\lambda_0$). E.g., two identical electrons ($electron_A$ and $electron_B$) in the frames of reference A and B, and an observer finds that the wavelengths of space waves created by electrons are different, then the observer will know how fast the inertial frames of reference move.

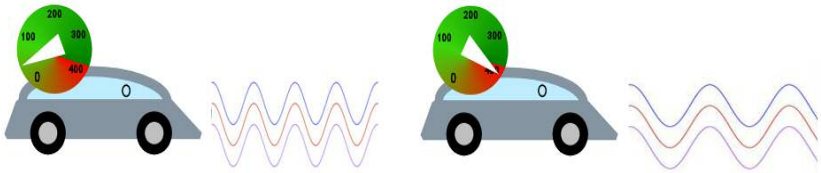

FIG. 12-2 The space waves are longer if the object is faster.
Model, not proportional.

The above-shown two “identical” cars as “identical” inertial frames of reference are not identical, since they make different wavelengths in space waves. Saying this, the Special Relativity theory must be corrected. In this theory the two inertial frames of reference moving at different velocities are identical, but according to space waves they are not. What should we change in special relativity? We should give up the idea of symmetry. This symmetry says no matter whether the observer or the object moves, the result will be the same on both sides.

It is not true. Space waves uncover the moving inertia frame of reference. It is important to know who or what moves and how fast it moves. Space waves show it.

12.2. Why is the speed of light constant?

How can the speed of light be constant in every (inertial) frame of reference?

The speed of light can only be constant if light is in the given frame of reference. How can it be? It can happen by using space waves created by the inertial frame of reference. We know that these waves are part of the frames of reference. Light travels on Space wave created by mass.

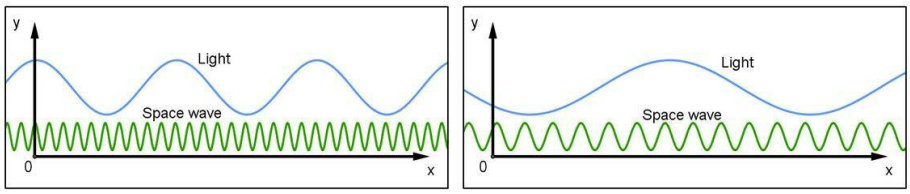

FIG. 12-3 Space wave and light wave at several velocities of mass.
x and y are spatial coordinates. Model, not proportional.

Light travels on Space waves generated by mass. Space is written in capital S means space that masses change. Light does not change Space waves. That is light travels in a space different from mass. The space of light, i.e. Space wave generated by mass is part of the frame of reference of mass, it is "glued" to the mass, that is the mass and the space of light are in one inertial frame of reference independent of the velocity of mass, i.e. independent of the wavelengths of Space waves. In this inertial frame of reference the velocity of light is constant c.

According to the above-mentioned, there are several spaces. Mass has its Space and light has its space and they are different. Saying this, the definition of space is not self-evident.

What is space? And what is time, and what is matter? To answer these questions we need to rethink some of our old concepts.

13. SPACE-MATTER MODEL: SPATIAL DISTANCES GIVEN BY SPACE WAVES

Can we measure space? Measuring space, we measure matter. The meter is the length of the path traveled by light in vacuum during a time interval of 1/299,792,458 of a second[36].

If we measure space by means of light, we use a kind of matter that has its own nature. We cannot measure space at all. We measure only matter.

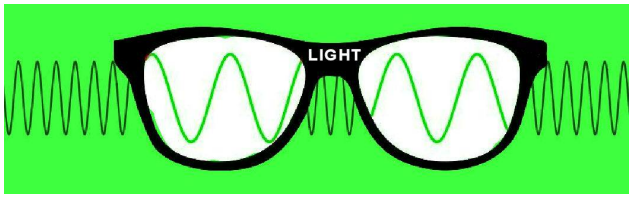

FIG. 13-1 We can see the length of space through light's glasses.
(Credit CC BY–NC–SA 4.0 T. Lajtner, Lajtner.com from CC0 Clker-Free-Vector-Images, Pixabay.com, Edited)

According to Space-Matter Theory, spatial distance exists without having been measured.

13.1. Wavelength and spatial distance

Eq. (11–1) is explained here. The given spatial distances of the object and of the observer can be given as the sums of the wavelengths of space waves: $s_{observer}=\sum\lambda_{observer\text{-}i}$ and $s_{object}=\sum\lambda_{object\text{-}i}$ and i=2, 3,…,n (i=1 is theoretical impossible), where

$$s_{observer}=s_{object}=\sum\lambda_{observer\text{-}i}=\sum\lambda_{object\text{-}i}. \qquad (13\text{-}1)$$

Eq. (13–1) shows that the observer is in the object's inertial system. If the object moves in relation to the observer because they are in different inertial systems, then $v_{observer}=0$ and $v_{object}\neq v_{observer}$, so the observer will realize Eq. (13–2).

$$s_{observer}\neq s_{object}. \qquad (13\text{-}2)$$

Eq. (13–2) shows the values we calculate using the theory of special relativity. The observer that can see the wavelengths of space waves finds Eq. (13–3).

$$\lambda_{observer}<\lambda_{object}. \qquad (13\text{-}3)$$

That is the object has greater velocity than the observer according to space waves. Here Eq. (13–4) will be true.

$$\sum\lambda_{observer\text{-}i}=\sum\lambda_{object\text{-}j} \quad (i=3,\ldots, n;\ j=2,\ldots, b), \qquad (13\text{-}4)$$

where n>b. The same s spatial distance measured from Object A1 to Object A2 can be made out of $n\cdot\lambda_{observer}$ and out of $b\cdot\lambda_{object}$. The observer's wavelength of space wave didn't change, but the object's wavelength of space wave did. In other words, the s spatial distance as $s_{observer}$ is built out of more space waves than the s_{object} if $v_{observer}< v_{object}$ according to space waves. The length contraction of s_{object} is a length dilation of the wavelength of the space wave. The length dilation of the wavelength of the space wave is not symmetrical; the wavelengths of space waves are different. There is an exception: the observer and the object can see the same wavelengths of space waves between each other.

The object travels the *s* spatial distance using its own space waves, that is the spatial distance for the object is really shorter, now it is made of p pieces instead of n where

$\lambda_{observer}<\lambda_{object}$. The $\lambda_{observer}<\lambda_{object}$ is a real phenomenon in space, not the viewpoint of the observer. Behind the relativistic length contraction is a real difference of the space's wavelengths of observer and object. Note the space waves that connect the observer and the object are their shared space waves. These space waves will change between the observer and object if one moves. The detecting of length contraction and time dilation remain true, both the object and the observer are able to detect them, since the length contraction and the time dilation appear using these shared, modified space waves. The symmetry is broken if we study the source of the change of the wavelengths of space waves. System A and B do not have the symmetry supposed earlier. The old axiom of indistinguishable inertial frames is out of order. (No. 2)

14. TIME GIVEN BY SPACE WAVES

What is time? Today's physicists claim that time is what we measure as time.
What does the phrase "what we measure" mean? We can measure only matter.

One second is defined as a changing character of the cesium 133 atom[37] we can measure. If we measure time by means of mass, we use a kind of matter that has its own nature. We cannot measure time at all. We measure only matter.

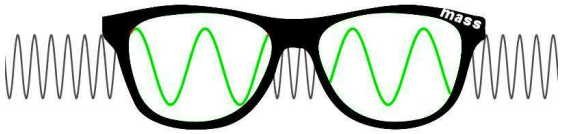

FIG. 14-1 We can "see" time through the glasses of mass.

One second has its start and has its end that we measure. The main element of time is the change. If there is no change, there is no time. We measure changes of matter measuring time.

According to Space-Matter Theory, time exists without having been measured.

14.1. Time as spatial waves

Space wave is a "normal wave" that has frequency, velocity and action. This velocity is constant like the velocity of light according to the frames of reference. According to LIGO, space waves have c velocity (although in Space-Matter Theory, space waves have over-superluminal velocity[e]). Saying this, space waves can be displayed the same way in an inertial frame of reference like light in FIG. 10–3.

In Space-Matter model, time comes into existence when matter and space meet. Also, whenever matter and space meet, the result is time. Time is the action-reaction phenomenon of matter and space, and appears as a spatial wave. Time depends on two things: on the given space and on the given matter that travels in the space.

According to modern physics, only mass has time. Accepting this, our time is the action-reaction of mass and space that exists as space waves.

This is not the only space wave i.e. not the only time, just our time. In other words, everything creates space waves, that is, everything creates time. We use in our life (and in physics models) time created by mass, but "non-mass" objects may use different space waves as time.

There is no way putting space and matter together without action and reaction coming into being. Or in other words there is no way putting space and matter together without time coming into being.

[e] Matter can have superluminal velocity and cannot have over-superluminal velocity. Space waves have over-superluminal velocity.

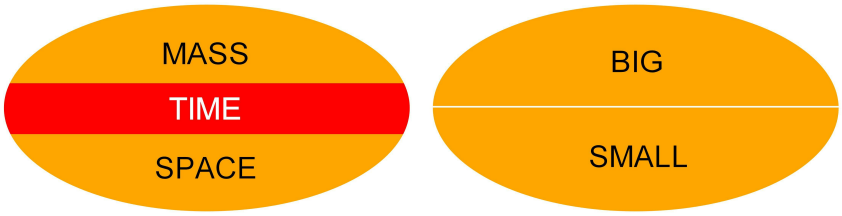

FIG. 14-2 Lajtner-burgers.
In the first picture Lajtner-burger shows how time connects Space and mass. A more complex solution called Lajtner-burger Diet is in the second picture:
BIG = matter and time for space.
SMALL = space and time for matter.
BIG and SMALL are fantasy names.
3D space + 3D matter = 3D space + 3D matter + Time.
Now it is clear where the name of Space-Matter Theory comes from.

Our time is the action-reaction of mass and Space that exists as Space waves. Wave of Space is not the only space wave, i.e. not the only time, it is just our time. In our life (and in physics models) we use the time created by mass, but "non-mass" objects may use different space waves as time. Photons create their own time, although physics states that a photon has no time. It is impossible, since photon is matter.

14.2. Our time wave and time unit

The actions between Space and mass, from the view point of mass, can vacillate between strong and weak. It oscillates. The change is periodic, and one period is one unit of time. This unit of time has two parts:

a) the hit, when Space acts upon mass most strongly;
b) the period between hits when the force of Space acts less strongly upon mass.

If we employ a cosine function to describe time, we get a periodic wavelength. Hence, it appears to be a good model: where a) equals the positive amplitude of the cosine function, and every other value of the function is b). In a time unit (in a single time wave), there is only one positive amplitude. Time is a repetition of these units. Time is the continuous alternation between a) and b). From the viewpoint of matter, time is characteristic of the periodic way that Space acts upon mass.

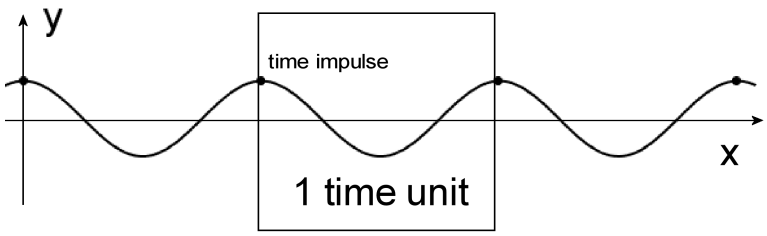

FIG. 14-3 Time as Space wave.
x and y are spatial distances. Model, not proportional.

FIG. 14–3 shows that a pulse of time exists if cos(x)=1, here marked as point. This is followed by a lack of time pulse when cos(x)<1. The longer the wavelength of the Space wave, the rarer the time impulse. Of course the action of the space wave gives the time impulses (i.e. the frequency is also important). Since time is given by Space wave, we get back to the function of time dilation putting the wavelength of the space wave in place of λ.

$$\lambda_1=\lambda_0(1-(v^2/c^2))^{-1/2} \text{ and, } t_1=t_0(1-(v^2/c^2))^{-1/2} \qquad (14\text{-}1)$$

Saying these, we can understand why the paper wheel rotates by thought force. Thought force changes the wavelength of Space wave i.e. time and Space are changed. The paper wheel will rotate. What else can we conclude from this? We can conclude if the wavelength of Space wave grows, mass accelerates.

14.3. Time's dimension

Time links our three spatial dimensions and the three spatial dimensions of space. Are they not the same? Three spatial dimensions are three spatial dimensions, aren't they? In mathematics yes. In physics, no. The *actions* of their building elements are at different scales. In addition the actions cannot change their given dimensions.

FIG. 14–4 shows there is an essential difference in the scale (of actions) of space and matter. Both exist in three-dimensional space, but matter is fundamentally incapable of entering the 3-D world of space. Similarly, space is unable to exploit the opportunities of matter's 3-D world. The picture below illustrates how space cannot span two bars, while matter cannot fit between them. (Space can be transformed into matter and vice versa. See later.)

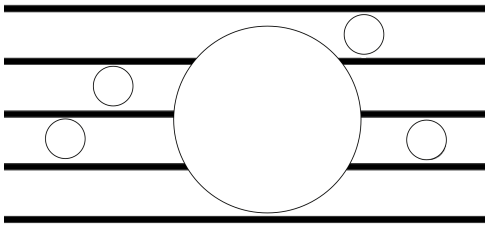

FIG. 14-4 There are two different three-dimensional spatial dimensions
depending on the actions of the objects.
Model, not proportional.

From the above statements, a new definition of time emerges. Time is the meeting of "bodies" that exist in two three-dimensional spaces that have different scales. In other terms: time comes into being if two different three-dimensional spaces meet that have different energy density.

Our time merges three different things: the three-dimensional spatial world of space, our three-dimensional spatial world of matter, and their actions and reactions. In our normal life we cannot sense the actions of space, therefore we can figure time with one time dimension. One dimension is a line. Spacetime is built out of this line and three (or more) spatial dimensions.

In quantum mechanics the objects are small enough to detect the effect of the action of space wave (time). From the viewpoint of an object in quantum mechanics, time is not a line, it is made of many actions, that is points. The number of these points is finite and calculable i.e. (theoretically) countable, therefore its (Hausdorff) dimension is zero if this definition of dimension is applicable here[38].

There are many objects, and every object has many actions. If we suppose that we cannot count the number of these actions, because it is like for example a Cantor set[39], then its time dimension is bigger than 0 but smaller than 1.

From the viewpoint of space, time is a cosine function according to my model. In reality, it is either a helix or another phenomenon with three dimensions. And there are many space waves in space (caused by mass and non-mass objects).

And finally time does not exist if there is no action-reaction phenomenon between space and matter.

It means we cannot picture time as “once and forever” given dimension of spacetime. Time’s old axiom is out of order. (No. 3)

15. ATTRIBUTES OF SPACE WAVES

15.1. Velocity of space waves is constant

If time waves are derived from space waves generated by mass, there arises a strange phenomenon—time and distance are the two sides of the same coin from the viewpoint of mass. Saying this, it is impossible for an object with mass to change any spatial distance without changing time, and changing time means changing the position in the given space.

See Eq. (15–1) - (15–3) where f means frequency.

$$f_{\text{space wave}}=f_{\text{time wave}} \qquad (15\text{-}1)$$

and

$$\lambda_{\text{space wave}}=\lambda_{\text{time wave}} \qquad (15\text{-}2)$$

If a mass generates growing wavelengths of space, the frequency of the space wave decreases, that is, the time unit for the mass grows in the same portion.

$$v_{\text{space wave}}=\lambda_1/t_1=(\lambda_0/(1-(v^2/c^2)^{1/2})/(t_0/(1-(v^2/c^2)^{1/2})= \\ =\lambda_0/t_0=\text{constant}=\lambda_0 f_0 \qquad (15\text{-}3)$$

15.2. Space unit and time unit given by the same spatial wave

Knowing Eq. (15–3), we can use the idea of Minkowski geometry to make the new time and distance model visible. Time is expressed in meters (axis t is expressed as $t\cdot v_{space}$). s_1 is the shortest distance for mass. t_1 is the shortest time unit for mass. Mass cannot exist without Δs and Δt, and they cannot exist without mass.

In reality FIG. 15–1 displays a very interesting coordinate system. It has no zero point. There are two cases: #1. Mass exists in Space, therefore the coordinate system also exists. Here $\Delta s>0$ and $\Delta t>0$. Since mass is in constant motion, so is the coordinate system. #2. There is no mass in Space, therefore the coordinate system does not exist at all. Ultimate and fundamental mathematics works without zero. Zero seems to be human invention.

In FIG. 15–1 the meeting point of mass and λ_{Space} can be seen as zero point.

Number “1” is not our invention. It is the unit of nature.

$$v_{\text{Mass-in-Space}}=\Delta s_1/\Delta t_1=\Delta s_2/\Delta t_2=1 \qquad (15\text{-}4)$$

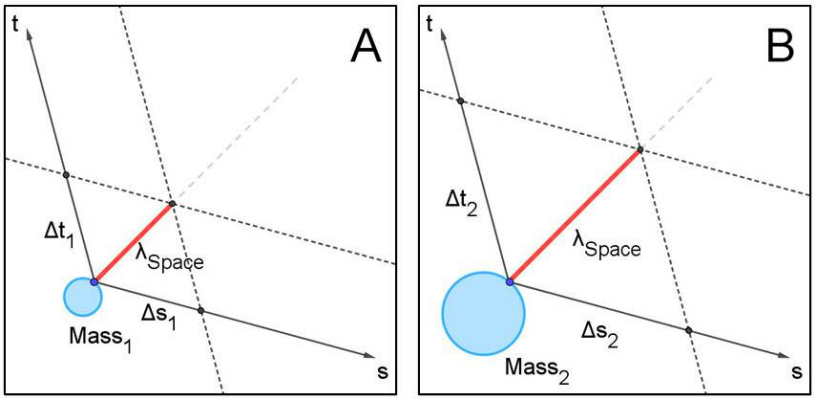

FIG. 15-1 Wavelength of space wave depend on the velocity of mass.
FIG. 15–1A and FIG. 15–1B show the same mass at different velocities. Accelerating mass $a_m>0$ gets additional mass from the space. In plain English: the moving mass increases or decreases, but the whole energy of matter and Space is constant. The law of conservation of energy needs both matter and space.

If $v_{Mass1}<v_{Mass2}$, then $\lambda_{SpaceA}<\lambda_{SpaceB}$. Bigger velocity makes the wavelength of Space wave longer. The λ_{Space} wavelength of Space wave creates the unit of time and spatial distance for the given mass. The λ_{Space} is the shortest time unit and the shortest spatial unit, i.e. t_1 and s_1 cannot be shorter for the given mass. The velocity of an object with mass changes the length of λ_{Space} wavelength of the Space wave but not its velocity. The wavelength of Space wave always defines 1 unit of time and distance. The growing length of units does not destroy the proportion of the units: 1 unit of distance/1 unit of time=1. The wavelength of Space wave is the smallest unit. Mass uses several pieces of space wave, a "set of space waves"to build its own unit of spatial distance and time. This "set" is one unit from the viewpoint of mass, therefore the above-mentioned explanations remain true.

Here we can have a question. How does Newton's Second Law of Motion in Eq.(6–1) work? It should be 1/t if s/t=1. Is there a contradiction here? No, it is not. The answer will be given in Chapter "Distortion of light".

Knowing the special theory of relativity, we can also say that FIG. 15–1B shows an object with bigger mass density, i.e. $m_{Mass1}<m_{Mass2}$. Objects with bigger mass will create longer wavelengths in Space. This statement will be important when we study gravity.

FIG. 15–1 explains how space and matter create time. An observer or an object gets moved in space. This is the action. The reaction of space is the change of wavelength of the space wave. This is followed by a reaction of the object. It moves faster. This is followed by a reaction of space—the wavelength of space wave grows. 15-5 shows a self-exciting process in terms of logic: the faster the mass the longer the wavelength of Space wave, the longer the wavelength of Space wave the faster the mass. If matter appers in Space, its wavelength will be longer, therefore 15-5 always exists.

$$(\Delta v_{mass} \Rightarrow \Delta\lambda_{Space}) \wedge (\Delta\lambda_{Space} \Rightarrow \Delta v_{mass}) \equiv \Delta v_{mass} \Leftrightarrow \Delta\lambda_{Space} \qquad (15\text{-}5)^{f}$$

Therefore, time is an action-reaction phenomenon and not a dimension. Eq. (15–5) shows more than just the action-reaction of Space and Mass. It shows that mass in Space will accelerate once it started moving unless acted upon by a force produced by any matter or if $\sum F_{Matter}=0$.

There is a force that always acts, this is the force of space.

[f] 15-5 can be read as Δv_{mass} being true is a necessary and sufficient condition for $\Delta\lambda_{Space}$ to be true or Δv_{mass} is true if and only $\Delta\lambda_{Space}$ is true.

Eq. (15–5) shows that $\sum F_{Space} \neq 0$.

There is no circumstance where there is no Space around the object or space around the matter. Therefore, there is no circumstance at all where matter exist, unless acted upon by the force of space, i.e.:

Force can created by space and matter, therefore:
There is no circumstance where matter exists,
unless acted upon by a force.

This is Lajtner's Law of Force. The force of space is missing from Newton's First Law of Motion. Of course we may understand Newton's Law in a wider meaning. See Eq. (15–6).

$$\sum F_{Matter} + \sum F_{Space} = AV = 0 \qquad (15\text{-}6)$$

where F_{Matter} is forces created by matter and F_{Space} is forces created by Space (or space). Knowing Eq. (15–5), in Eq. (15–6) AV=0 is a very abstract, theoretical value. The actual value of AV may oscillate around 0.

Does Eq. (15–6) save the original form of Newton's First Law of Motion? No, it does not.

15.3. Problem with Newton's First Law of Motion

Knowing space waves, Newton's First Law of Motion is disputable. It needs modification. This modified law is called Lajtner's Law of Motion, and it sounds like this: $\lambda_{t+1} > \lambda_t$, where t=1, 2… is time. In Space, a given object *accelerates* (a>0), unless acted upon by a force created by a third object. We study the given object with mass, the third object is an object we do not study, but exerts force upon the given object.

The acceleration of the given object can be measured by an observer. The same event from the viewpoint of Space and from the viewpoint of the object can be given this way: From the viewpoint of Space: in Space an object with mass continues to move at constant velocity in a straight line, unless acted upon by a force exerted by a third object.

The velocity of mass is constant: $v_t=1$.

1 unit of distance/1 unit of time=1, therefore $v_{t+1} - v_t = 0$ where t>0 and integer. Mass does not accelerate in Space from the viewpoint of velocity of Space wave and the given mass. As mentioned earlier from the viewpoint of an observer this motion is an accelerating motion, since $\lambda_{t+1} > \lambda_t$. This kind of acceleration is constant from the viewpoint of an observer, every object with mass has the same acceleration caused by Space, because $\Delta\lambda/\Delta t$=constant.

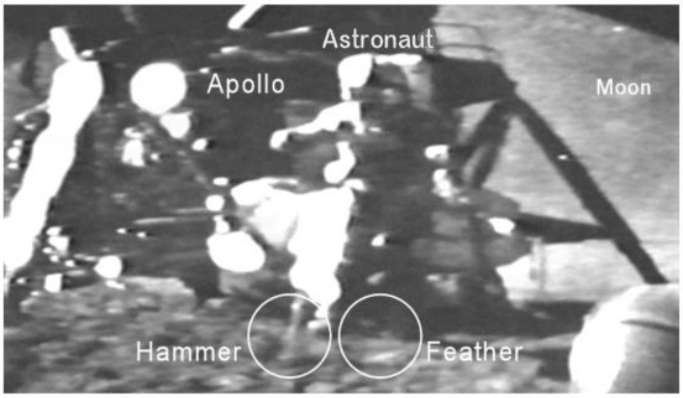

FIG. 15-2 Apollo on the Moon.

The picture requires a bit of imagination.
(Credit © Public Domain Apollo 15 Crew, NASA, Excerpt, Edited, https://moon.nasa.gov/resources/331/the-apollo-15-hammer-feather-drop/)

Gravitational acceleration confirms this theory. Watch the gravity experiment on the Moon: Hammer vs. Feather. FIG. 15-2 shows them before they have almost reached the surface of the Moon. Both had the same gravitational acceleration.

In space, an object with mass continues to move at constant velocity v>0 in a straight line from the viewpoints of velocity of Space waves and the given moving object. If this motion is a motion with constant velocity from the viewpoint of an observer, it means that $\lambda_{t+1}=\lambda_t$. In this case force created by matter *does act* upon the object, since function $\lambda_{t+1}>\lambda_t$ is not true. In Space $v_{object}>0$ and ever $v_{object}\neq 0$, because particles cannot stop vibrating. Lajtner's Law of Motion is in contradiction with Newton's First Law of Motion. And with today's academic physics that accepts Newton's First Law as fact. This is not a fact, it is actually Galileo's 400 year old opinion. Newton's First Law of Motion is not a law, but an axiom, and we will have to change it. (No. 4)

15.4. Space as inertial frame of reference

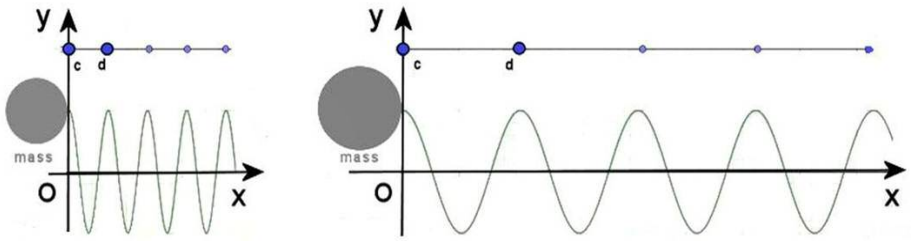

FIG. 15-3 Mass (gray circles in the picture) and Space waves.
y and x are spatial coordinates. In the forthcoming parts of this study, "$space_m$" or "Space" are synonyms of space where mass exists.
In terms of modern physics Space is where fermions interact with the Higgs field[40, 41] and Higgs bosons acquiring mass this way, although Higgs bosons are unnecessary in Space-Matter theory, because Space waves create mass.
A bigger or a faster mass makes longer wavelengths in Space waves. The wavelength of Space wave is as spatial unit distance and frequency as time unit for mass.
Cosine model, not proportional.
(Credit CC BY–NC–SA 4.0 T. Lajtner, Lajtner.com)

Mass meets only the cd section of Space. This cd section is Space for the given mass. The cd section consists of Space waves that are created or changed by the given mass.

This does not mean that mass has no effects on a significant part of Space. Space waves created by mass are longer than section cd. And they are fast, i.e. an object with mass changes a "big" part of Space. This far-reaching action of mass is an important part of the cooperation between mass and Space, this is the way how an object gains its mass.

Mass cannot change its velocity compared to the velocity of Space waves, since the longer wavelength of space wave means longer distance and longer time unit, where Eq. (15–4) remains true. This change in wavelengths of Space wave gives the mass of the object.

Knowing this, the following three expressions are used as synonyms in order to make the explanation more simple: Mass cannot change its velocity compared to the velocity of Space waves. Mass cannot change its velocity compared to Space waves or more simple to Space.

FIG. 15–3 offers a new way to explain the cooperation of Space and matter and explains the above-mentioned more precise. Space wave is a special inertial frame of reference, where the velocity of Space wave is constant from the viewpoint of the travelling mass and the velocity of this mass is constant from the viewpoint of Space wave modified by the given mass. From our viewpoint this mass in FIG. 15–3 accelerates. The changing velocity of mass changes the wavelength of Space wave, but even the accelerating motion of mass in a frame of reference of an observer seems to be a constant velocity from the viewpoint of the velocity of Space wave. Even more, since $\lambda_{\text{Space wave}}$ is of very short distance, rotation of matter seems to be a motion in a straight line at a constant speed[g]. Space is a special, non-mass inertial system.

Axiom of inertial frame of reference only made of matter is over. (No. 5)

From our viewpoint in Space's inertial frame of reference, an object with mass neither remains at rest nor does it continue to move at a constant velocity. It accelerates, unless acted upon by a force created by matter. The same acceleration does not change the velocity of mass measured by the wavelengths of Space waves that are modified by the given mass. This is the other form of Lajtner's Law of Motion.

15.5. How big is the velocity of mass in Space?

FIG. 15–1 shows the constant velocity of mass in Space. On the other hand every mass is connected directly only with the cd section of the Space wave shown in FIG. 15–3. If mass enters the cd section, it generates a new cd section. Space wave itself is the action-reaction of mass and Space and it spreads in Space.

How does the frame of reference made out of Space wave show the acceleration of mass that appears in a non-Space frame of reference? It will appear as the change of wavelength of Space wave. Space waves act like light waves. To be more precise light waves work like space waves, see FIG. 15–3. The wavelength changes, the velocity remains unchanged.

So we expect there to be no acceleration (a) in the frame of reference of Space according to the velocity of Space waves. The calculation with the wavelength of Space wave is in Eq. (15–7). Space wavelength is the unit wavelength *from the viewpoint of the given mass*; its value is always 1 for the given mass, since λ is the basic unit—unit distance and time unit— in Space.

$$a= (\lambda_1-\lambda_0)/1^2=(1-1)/1^2=0. \qquad (15\text{-}7)$$

Look at Eq. (15–8).

$$a=(\lambda_0/t_0)/(t_0/(1-(v^2/c^2))^{1/2})=(\lambda_0/t_0^2)(1-(v^2/c^2))^{1/2}=0 \qquad (15\text{-}8)$$

Indeed, there is no acceleration in the inertial system of Space wave marked as cd. As mentioned earlier accelerating motion may appear in a non-Space frame of reference according to the mass, but it may not appear in the frame of waving Space. What else does Eq. (15–8) show?

It shows that v=c. In $space_m$ (in Space of mass) mass travels at c_{space_m} velocity. Note c_{space_m} works inside $space_m$ i.e. mass travels at this velocity measured by Space waves modified by mass. This is the only velocity of masses in $space_m$. Since there is only mass in this $space_m$, this is the only velocity in this Space ($space_m$ = Space).

This velocity c_{space_m} is the velocity of mass in Space expressed in our physics units. The speed of light has the same value in its space measured by masses. The velocity of mass is c from the viewpoint of Space.

---

[g] Velocity is a vector quantity. The permanent change of direction of the velocity of a spinning object is a permanent changing velocity, i.e. an accelerating velocity. In the case of a non-wave elementary particle its "elasticity" decides how fast its spinning and rotation can be. This is an action-reaction phenomenon with a natural "speed limit". Saying this, these particles seem to have structures.

15.6. Action and frequency of Space waves

Let us study Eq. (15–9).

$$E_{Space}=h_{Space}\cdot f_{Space}, \qquad (15\text{-}9)$$

where E_{Space} is the energy and h_{Space} is the action of Space wave. (1 and 2 indicate different circumstances of the same space.)

$$\text{If } E_{Space\_1}>E_{Space\_2},$$
$$\text{then } v_{Mass1\_in\_Space\_1}< v_{Mass1\_in\_Space\_2} \text{ or}$$
$$m_{Mass1\_in\_Space\_1}< m_{Mass1\_in\_Space\_2}.$$

Solely through the use of Space waves, we can express spatial distance, time and energy. Space waves are not only indicators of these phenomena. These phenomena are created by Space waves.

- Every spatial distance can be expressed by using the wavelength of Space waves.
  In our physics terms this is the shortest unit of distance.
  The length or wavelength of matter is always longer.
- Every unit of time can be expressed by using the frequency of Space waves.
  In our physics terms this is the shortest unit of time.
  The frequency or the vibration of matter is always higher.
- Every amount of action (energy) can be expressed by using the value of the action of Space waves.
  In our physics terms this is the smallest unit of action.
  The action of matter is always bigger.

The time dilation and the λ_{Space} dilation (= length contraction) do not change our metrics. See the wave number k in Eq. (15–10). Let us see FIG. 15–1. once more. The shortest distance unit in Space is λ_{Space} . 1 meter spatial distance is made out of k pieces of λ_{Space} no matter how long λ_{Space} is. In other words 1 meter has always the same space units.

$$k=1\text{meter}/\lambda_{Space}=\text{constant}. \qquad (15\text{-}10)$$

1 second time is as long as the Space wave creates f_{Space}. FIG. 15–1 also displays the shortest time unit in Space, it is $t_{shortest}$; see
Eq. (15–11),

$$t_{shortest}=1/f_{Space}. \qquad (15\text{-}11)$$

The lengths of the meter and second are dependent upon Space waves. Note this is not the theory of special relativity. In our case we speak about real changes of Space waves.

One Space wave has one h_{Space} action. The following equations come from the Planck constant h.

$$h=h_{Space}\cdot H_{Space} \qquad (15\text{-}12)$$

or more generally

$$h=h_{space\text{-}i}\cdot H_i, \qquad (15\text{-}13)$$

where $h_{space\text{-}i}$ depends on the given $space_i$ (e.g. on Space) and it is constant in the given space.

H_i has no dimension, it shows the relationship between h and $h_{space\text{-}i}$.

Since in $space_i$ $v_{space\text{-}i}$=constant, and $h_{space\text{-}i}$=constant the unit spatial distance, the time unit and the action unit are embedded in $\lambda_{space\text{-}i}$, in $f_{space\text{-}i}$ and in $h_{space\text{-}i}$.

Using $h_{space\text{-}i}$ we can define what matter is and what space is.

16. WHAT IS MATTER, WHAT IS SPACE?

You will soon see there are several spaces, and not all objects are able to use all spaces. So it has to be defined what space and matter mean. Let us see some simple definitions first.

Space is what matter uses as space. Matter is what space allows to exist as matter in the given space. There are spaces that the given matter cannot use as space, and there is matter that cannot exist in given spaces. For example, light normally does not exist in Space. There are several spaces and forms of one given matter. For example, the particle we know as *electron* can exist in a special space as fast wave that has superluminal velocity. In some cases space can be made of an object that we know as matter.

16.1. Action and density of space and matter

The simplest way to define space is to give its $h_{space\text{-}i}$ value. Our known Space has the smallest h value shown in Eq. (16–1).

$$h_{Space}=é\cdot h_i, \qquad (16\text{-}1)$$

where h_i is the action of any different space or matter and $0<é<1$.

It is also possible to use the density of space. If we calculate with little Space cubes whose size can be given as λ^3_{space} (m^3), knowing the action of Space wave and knowing λ_{Space}, we can calculate the density of Space. It is D_{Space}.

Using the simplified Space-Matter model with cosine functions, we can conclude that the density of the proton is nineteen orders of magnitude beyond the density of Space. See Eq. (16–2). The nuclear density of a proton is $D_{proton}=1.14\cdot10^{53}$ eV/m^3. The radius of the proton is discussed[42]. The discussion may influence the calculation, but not the conclusion.

$$D_{Space}>>D_{proton}, \qquad (16\text{-}2)$$

The density of Space is very important. From our viewpoint it can change because of the growing wavelength of Space wave. If Space's density is small enough, Space can turn into matter.

16.2. What is space, what is matter?

If the actions and the density are given by Eq. (16–3).

$$h_{object}=h_{Space\text{-}1} \text{ i.e. } D_{object}=D_{Space\text{-}1} \qquad (16\text{-}3)$$

then this object is Space for masses and no matter in our known world. Space has the smallest action and the biggest density. The action of matter is always bigger than h_{Space}. The density is always smaller than D_{Space}. If

$$h_{object}>h_{Space\text{-}1} \text{ (or } D_{object}<D_{Space\text{-}1}), \qquad (16\text{-}4)$$

this object is matter in Space, says Eq. (16–4). If the action of an object is bigger than the action of Space, or in other words the density of an object is smaller than the density of Space, this object can act as space from the viewpoint of a third object, and can act as matter from the viewpoint of another object.

To be more precise:

$$h_{obj\text{-}kinetic}/h_{object}<h_{Sp\text{-}kinetic}/h_{Space}, \qquad (16\text{-}5)$$

where $h_{kinetic}$ is defined in Chapter 20. Eg. 16-4 and Eg. 16-5 are important in tunneling. In tunneling there is a barrier made of matter, but electrons and photons use it as space. The barrier can be called space made out of matter, or matter-space, in short. The old axiom of space is away. (No. 6)

Eq. (16–3) shows a static situation. In reality Eq. (16–6) works, the action and the density of Space can be changed. For example the density of Space decreases in a galaxy, because the wavelength of Space wave grows.

$$D_{Space\text{-}2}<D_{Space\text{-}1}. \qquad (16\text{-}6)$$

The notions of Space, time and matter are not as simple as we thought earlier. They had to be defined. These are the very first complex definition of space, time and matter. Without these definitions, we will neither understand the working method of spaces like matter-space, nor understand how matter objects exist in matter-space. Here we can use the above-mentioned new definition of time in a wider meaning stating that time is the action-reaction of space and matter, where space is either Space or matter-space.

Are light and fermion really able to travel in matter-space? Yes, they are. Let us see how light travels in different spaces.

17. FREQUENCY LEVEL OF LIGHT

Light works. How does it work? It has several "built in" functions that run light.

17.1. Phase velocity

When the medium is not vacuum, Eq. (17–1) is used in calculations of phase-matching in nonlinear optics.

$$P=nE/c, \qquad (17\text{-}1)$$

where in general $n=(c/v_l)>1$ is the refractive index of a transparent optical medium, also called the index of refraction of the material in which the signal propagates. v_l is the velocity of light in-non-vacuum, that is, in medium. The index of refraction[43] is the factor by which the phase velocity v_{phase} is *decreased* in relation to the velocity of light in vacuum. In the case of one photon wave $v_{phase\text{-}c}>v_{phase\text{-}M}$ and $v_{phase\text{-}c}=c/n$, where $v_{phase\text{-}c}$ represents light velocity in vacuum and $v_{phase\text{-}M}$ represents light velocity in medium. During refraction, the frequency of light wave remains unchanged $f_{phase\text{-}c}=f_{phase\text{-}M}$, while the wavelength of light wave decreases $\lambda_{phase\text{-}c}>\lambda_{phase\text{-}M}$.

Fast light experiment can be a good example of the refraction.

17.2. Fast light experiments

Let us take a look at the fast light experiment carried out at the University of Rochester, USA[44]. In this experiment, "normal" light impulse (of velocity *c* and formed of a group of lights) travels on optical medium and fast light impulse (formed of a group of lights) travels on "normal" light. Fast light has a longer wavelength than normal light traveling at c. $\lambda_{fl}>\lambda_c$ and a measurable superluminal velocity of fast light $v_{fl}>c$. In the fast light experiment the envelop (fast impulses) is constituted of a spread of optical frequencies of sinusoidal (sine, cosine) component waves[45] that is phase velocities v_{phase}. The velocity of impulse is group velocity (envelop), where generally $v_{fl}=v_{group}\neq v_{phase}$ but sometimes $v_{group}=v_{phase}$ is true.

This kind of superluminal velocity will be called superluminal$_{Group}$. In generally, at superluminal$_{Group}$ velocity the information does not go faster than c. Photons remain in the known state of photon. Here is the effect of the refraction important.

The refraction and matter-space are different phenomena. Matter-space is a different space and not a different refraction of the given space.

There are several fast (and slow) light experiments. E.g. Kondakci's experiment[46] produces values of group velocity range from subluminal values of 0.5c to the superluminal$_{Group}$ values extending up to 32c.

In different space e.g. in matter-space the information and photon or other particle have superluminal *phase* velocities. These spaces can be called superluminal spaces.

How does light work in a superluminal space, e.g. in a matter-space?

17.3. Frequency level of light

We can express how light works in Eq. (17–2). Light holds its frequency level constant compared to the frequency of the space wave of the space where light was created. The

gravitational red shift clearly shows that frequency is not constant, but the frequency level of light is constant. For a given light (or photon) Eq. (17–2) is valid from the viewpoint of light for the whole lifetime of the given light (photon) in a given space.

$$f_{light}/f_{space}=\text{constant.} \qquad (17\text{-}2)$$

It is like zooming in and out from our viewpoint.

According to Space-Matter theory, there are spaces made of matter where photons are able to travel. Here are different rules, but in every space works the same fundamental law. Light travels at velocity c.

17.4. c means more than just the speed of light

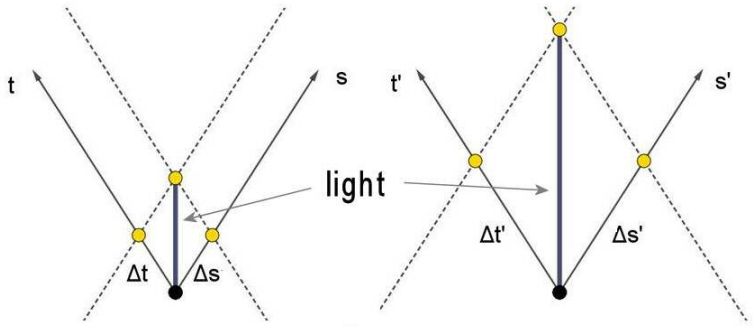

FIG. 17-1 Velocities of light in different spaces.
t and s are expressed in meters. Coordinate system st is light's space, s't' is matter-space. According to light the following function is true in every space: Δs/Δt=Δs'/Δt'=1.
The constant rate does not depend on the wavelength of space waves.

Mass also uses its constant rate in Space. Off course, FIG. 15–1 remains true. Fermions change the wavelength of Space waves, light does not.

$c_{space\text{-}i}=c=1$ is a very important constant in every space. This is the velocity at which the objects travel in their own "i" spaces. In other words, in every "i" space the objects travel at $c_{space\text{-}i}=c=1$ velocity, but different "i" spaces have different values of $c_{space\text{-}i}$ *from our point of view*; $c_{space\text{-}i}$ can be different from our c—from our point of view. In general $space_i$ is a space where $object_i$ generates $time_i$, and where $object_i$ travels at $c_{space\text{-}i}=c=1$.

There is only one velocity in given space: $c_{space\text{-}i}=c=1$. Every particle or object that travel in this space has the same $v=c_{space\text{-}i}$ velocity.

Different spaces mean different circumstances i.e. different velocities of the same particle. Light and other particles accept these different circumstances. Axiom of one single space is over. (No. 7)

In different spaces particles work in different ways. How do they do it? They are capable of surprising metamorphoses.

18. WAVE-PARTICLE DUALITY IS A TRIALITY

Wave–particle duality is a known metamorphosis of matter. It is the concept that all matter can exhibit two behaviors—a particle-like behavior and a wave-like behavior. In other words, every elementary particle or quantic entity may be partly described in terms not only of particles, but also of waves. The well-known de Broglie wavelength [47] λ shows the connection between the p momentum of photon and Planck constant. See Eq. (18–1). *E* is the energy of photon. This is actually Planck's law in different form.

$$\lambda=h/p=c(h/E) \qquad (18\text{-}1)$$

18.1. Hidden presumption behind wave-particle duality

The original version of the de Broglie wavelength means that the particle turns into a wave if Eq. (18–2) is true:

$$\lambda_{particle} \geq l_{particle}, \qquad (18\text{-}2)$$

where $l_{particle}$ is the size (length) of the particle. $\lambda_{particle}$ is the wavelength of the particle if it is a wave.

Actually there is a hidden presupposition behind the formula of the wave-particle duality which is that space wave does not exist. De Broglie did not know about space waves, therefore there is no space wave in Eq. (18–2). If we involve the wavelengths of space waves in the formula of wave-particle duality we can see the uncovered presumption in Eq. (18–3).

$$\lambda_{particle} \geq l_{particle} > \lambda_{space}. \qquad (18\text{-}3)$$

18.2. Fast wave-wave-particle triality

There is a known phenomenon called tunneling. In tunneling particles travel faster than light. How is it possible? I think in tunneling particles travel in matter-space. The wavelength of matter-space is longer than the wavelength of Space, remember chapter "Action and frequency of Space waves".

If the wavelength of space wave is longer than the wavelength of the wave of the particle, then fast wave comes into being.

$$\lambda_{space\text{-}i} > \lambda_{particle} \geq l_{particle}. \qquad (18\text{-}4)$$

In $space_i$ when Eq. (18–4) is valid particles exist as fast waves.

$$\lambda_{fw} > \lambda_{space\text{-}i}. \qquad (18\text{-}5)$$

Today's physics cannot measure $\lambda_{space\text{-}i}$. In our calculation of tunneling we suppose

$$\lambda_{fw} > l_{space\text{-}i}, \qquad (18\text{-}6)$$

where $l_{space\text{-}i}$ is the length of matter-space i.e., the length of the barrier.

Fast waves have no mass. We know photons have no mass. In tunneling electrons are also massless. This massless condition is in harmony with the creation of mass described in Space-Matter Theory, because fermions are originally massless as it is written above. In matter-space particles exist as fast waves. Tunneling is a good example for fast waves and matter-space.

If a fermion (electron) has no mass, this is its third condition. This means there is a fast wave-wave-particle triality instead of wave-particle duality.

Let us study several experiments of tunneling. Here we will find both wave and fast wave.

19. TUNNELING: SPACE MADE OF MATTER

19.1. Tunneling

Quantum tunneling refers to the quantum mechanical phenomenon where a particle (with or without mass) tunnels through a barrier that it normally could not surmount.

In experiments many particles are sent to the barrier, and only a part of them gets through the barrier. They are the tunneling particles.

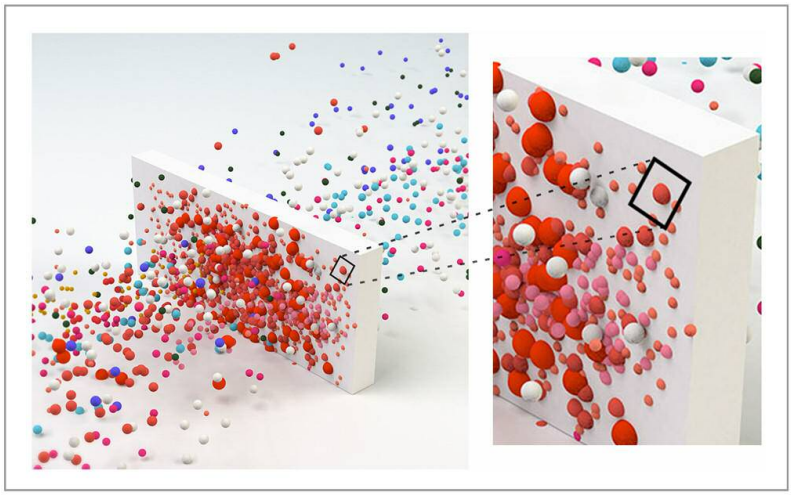

FIG. 19-1 Tunneling.
(Credit: Artistic representation CC0 Christophe Lebedinsky, toutestquantique.fr, Edited)

Fig. 19–1 shows clearly that in tunneling only the group velocity is important, physicists do not observe single particles i.e. phase waves. But if we examine the tunneling effect as the behavior of *a given* particle, we can analyze *this* single particle i.e. *its* velocity. Analysing the tunneling of one single particle we can draw conclusions on matter-space and the metamorphoses of this particle. In the forthcoming parts of this study I analyze the behavior of a "single" tunneling particle e.g. which is framed with black. Particles travel at superluminal velocities during the tunneling, therefore these particles will be called fast waves in the forthcoming parts of this study. (The above mentioned fast light is not a fast wave, because it remains measurable. Fast wave is immeasurable.)

Nimtz[48], Enders and Spieker first measured superluminal tunneling velocity with microwaves in 1992. According to their statements, the puzzle is that the jump of the particle over the barrier has no time (it spends zero time inside the barrier) and the particle is undetectable in this condition. Tunneling, however, does take time, which can be measured.

According to Nimzt, the particle cannot spend any time inside the barrier[49], because the wave function has no missing part (and no missing time). The tunneling method of the particle is unknown and immeasurable. If the wave does not spend time inside the barrier, what is the tunneling time? Nimtz supposes that the measured barrier traversal time is the time spent at the front boundary of the barrier.

There comes the second riddle in tunneling. Experiments show[50] that tunneling particles are faster than light, and these facts are *not* compatible with the Theory of Relativity. According to Theory of Relativity the growing velocity of particles with a mass (for example an electron) causes

growing mass, and if $v \rightarrow c$, then mass $m \rightarrow \infty$. Since the mass m (of the electron) is never ∞, and the tunneling is fact, we have to suppose that v=c never occurs. There is a discrete jump at velocities, and v<c becomes v>c without v=c. The velocity v>c is immeasurable as yet.

19.2. Tunneling particles—fast waves

In tunneling, the light meets a barrier that acts as a matter-space. The light "decides" whether it can enter this space. I suppose it depends on the unit action, wavelength and frequency of the matter-space. If it can enter this barrier as matter-space, it has to adapt itself to the new space. It will probably change its spin as well. Different space and different time force a metamorphosis of the $object_1$. $Object_1$ will appear in a form that is not written in our books. I think in tunneling objects are fast waves and even the electron (fermion!) is massless here. As mentioned above, the massless condition can be created, because the electron leaves the Space and enters into matter-space. The axiom of matter is only matter is over. (No. 8)

Let us see the electron during tunneling. We assume the tunneling shows that $v_{tunneling\text{-}object}>c$. It is a fact measured. The electron has mass. The tunneling electrons seem to violate the special theory of relativity[51]. They do not violate it if we suppose electrons have different forms in different spaces, and the barrier acts as matter-space. In matter-space the tunneling electron becomes fast wave[52]. The metamorphoses from particle into fast wave and back do not mean that the electron changes identity. The essence of the electron always remains the same, only the form of the electron changes. Particle, fast wave, particle. Let us see the two metamorphoses of an electron during tunneling[53].

Tunneling presented from the viewpoint of the form of the electron (or other tunneling particle):

- Before the barrier: electron—particle or wave.
  - Metamorphosis 1.
- In the barrier: unknown object (fast wave).
  - Metamorphosis 2.
- After the barrier: electron—particle or wave.

It means that the unknown, faster-than-light-object is the same electron we know, but it *does* have a new form we do not know. The given form of an electron always depends on the space in which it travels.

So there is a 'fast wave–wave–particle triality' instead of the 'wave–particle duality'. Note fast wave is a form of particle made of matter.

19.3. Changed spins?

During tunneling the spin of the electron probably changes as well. This change needs time. Therefore tunneling time is longer than pure travelling time in barrier. The changing spin and the new kind of space may be able to explain the metamorphosis of the particle and its tunneling time. The available data fail to establish anything certain.

The tunneling shows that also photons with no mass make metamorphoses, since their measured tunneling speed is superluminal and not c from our viewpoint. That is, generally speaking, the given form of $object_1$ with or without mass depends on the space in which it travels. $Object_1$ has several forms, and its forms depend on the spaces where it travels. Its actual form seems to have its own range of velocity. In tunneling it appears as fast wave and from our viewpoint it has superluminal velocities. Axiom of every elementary particle has only its known form is out of order. (No. 9)

19.4. How does tunneling work?

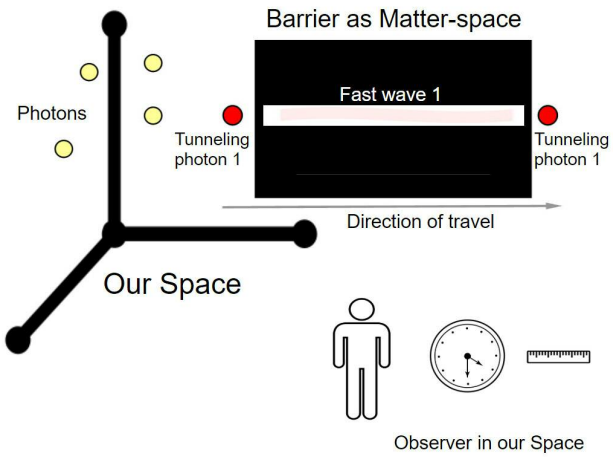

FIG. 19-2 Observer in Space measures the data of tunneling.
Model, not proportional. In the experiment the observer knows the length of the barrier, the tunneling time, the frequency and the wavelength of photon before tunneling. See Table 19–1.
(Model, not proportional.)
(Credit © T. Lajtner, Lajtner.com from CC BY 4.0 from Space CC BY 4.0 E Bolat, edited; Clock CC BY 4.0 BF Varsino, edited; Ruler CC BY 4.0 S Walter, edited; Black box CC BY 4.0 A Kirma, edited; Man Public Domain CC0 JR Kim, edited. The edited pictures are from Noun Project.)

Topic	Experiment 1	Experiment 2	Experiment 3	Note
ú	4.702	8.552	2.565	$ú = \frac{v_{fw}}{c}$
f_0	$8.7 \cdot 10^{9}$	$9.97 \cdot 10^{9}$	$8.7 \cdot 10^{9}$	frequency of light before tunneling (1/sec)
λ_0	$3.45 \cdot 10^{-2}$	$3.01 \cdot 10^{-2}$	$3.45 \cdot 10^{-2}$	wavelength of light before tunneling (m)
T	$8.1 \cdot 10^{-11}$	$1.17 \cdot 10^{-10}$	$1.30 \cdot 10^{-10}$	tunneling time (sec)
L	$1.142 \cdot 10^{-1}$	$3.00 \cdot 10^{-1}$	$1.00 \cdot 10^{-1}$	length of the barrier (m)

Table 19-1 The tunneling times and the lengths of barriers in three experiments.
The experiments are made by Nimtz[54, 55, 56]. Here matter particles travel at superluminal velocities: $v_{fw}>c$. This kind of superluminal velocity will be called superluminal$_M$.
The highest speed was measured in Experiment 2, here the fast wave is 8.552 times faster than a photon.

How does tunneling work? The question can be answered by using the new space and time definitions and knowing how light works. The barrier is a space made up of matter, matter-space where $h_{barrier}>h_{Space}$. Therefore the photon in the barrier functions as fast waves, and it travels inside the barrier at $c_{matter\text{-}space}=c$.

Matter (light) is functioning as fast wave in the barrier and the barrier acts as matter-space. Light holds its frequency product constant, i.e. it remains the same value that was in light's space.

Otherwise in matter-space light works the same way as in its “normal” space. In matter-space, like in light’s space its frequency level and its coordinate system are constant. Light enters matter-space. This is a very simple step shown by FIG. 17–2 This is one step move in accordance with light, but an adequate model that describes the details is of several steps. Light detects the wave of the barrier and adopts it as the new reference wavelength. Its frequency will be given by the product of frequencies from Eq. (17–3). It develops its f_{fw}. Light holds the frequency level $f_{fw}/f_{space\text{-}i}$ constant in this matter-space in accordance with
Eq. (17–2), i.e..

Travel in space (=spacetime) or travel in matter-space are different conditions even for light itself. See the product of frequencies in Eq. (17–3). The longer or shorter *t* and *s* do not make a difference as long as they are a simple change of wavelength of Space. But in this case the units are changed. Matter-space is a different space with different space action.

19.5. Travelling time in the barrier

We are able to measure only tunneling time, but tunneling time is longer than traveling time in the barrier. As mentioned above, according to Nimzt’s statement, the particle does not spend any time inside the barrier. In fact it does, but its actual travelling time inside the barrier is much shorter than tunneling time.

$$t_{tunneling}=t_{Metamorphosis1}+t_{travelling}+t_{Metamorphosis2} \qquad (19\text{-}1)$$

Eq. (19–1) shows that a particle needs time to adapt itself to the new space. This is something like we will see soon in the case of the spooky action. Why do traveling particles need time for metamorphosis? Because they must rescale the structure of their action h. Let us see what it means.

19.6. Slow tunneling?

Ramos and his team[57] constructed an unsual tunneling environment. The tunneling ”particles” were rubidium (Rb) atoms instead of elementary particles. Rb atoms traveled through a 1.3 μm thick optical barrier made of laser beam. (The laser beam has no mass.)

Here Ramos measured a traversal time of 0.627 ms, i. e. $v_{tunneling}=2.07^{-3}$ m/s, i. e. ú<<1.

This result is in fundamental contradiction with the superluminal tunneling velocities measured by Nimtz and many others in the last years.

I think either Ramos came up with a new way of tunneling, or it is not tunneling, just traveling through a transparent optical medium (optical potencial) with a certain index of refraction, or it is a special mix of these.

Saying this, in this experiment the Rb atoms do not use the laser beam as matter-space.

20. THE TWO PARTS OF THE PLANCK CONSTANT

Let us use the data of Table 19–1. λ_0 means the wavelength of light before tunneling. f_{fw} is the frequency of the tunneling particle in the barrier. The tunneling particle is a fast wave from our point of view.

Now we can study the same particle in two different spaces using a very simple method often used in economics but not in physics.

See Eq. (20–1, 2, …12).

$$f_{fw}\cdot\lambda_{fw}=v_{fw} \text{ and } f_0\cdot\lambda_0=c \qquad (20\text{-}1)$$

$$á=f_0/f_{fw} \qquad (20\text{-}2)$$

$$(f_0/á)\lambda_{fw}=v_{fw} \text{ and } f_0=c/\lambda_0 \qquad (20\text{-}3)$$

$$(1/á)(c/\lambda_0)\lambda_{fw}=v_{fw} \qquad (20\text{-}4)$$

$$(1/á)(c/v_{fw})\lambda_{fw}=\lambda_0 \qquad (20\text{-}5)$$

Let us study the de Broglie wavelength of λ_0

$$h/p=\lambda_0=(1/á)(c/v_{fw})\lambda_{fw}, \qquad (20\text{-}6)$$

$$\lambda_{fw}=á(v_{fw}\cdot h)/(c\cdot p)=á((v_{fw}/c)\cdot h)(1/p). \qquad (20\text{-}7)$$

If $v_{fw}=c$ and á=1, then we get back the original formula. Since h is the attribute of the particle (photon), we can write Eq. (20–8).

$$h_{particle\text{-}0}=h_{particle\text{-}fw}. \qquad (20\text{-}8)$$

Let us use the expression $(v_{fw}/c)\cdot h$ in the Planck's law this way.

$$E_0=á\cdot f_{fw}(c/v_{fw})((v_{fw}/c)h)=á\cdot f_{fw}\cdot h. \qquad (20\text{-}9)$$

$$E_0=á\cdot f_{fw}(1/h)((c/v_{fw})h)((v_{fw}/c)h), \qquad (20\text{-}10)$$

where $v_{fw}\neq 0$. So

$$h_{rest}=(c/v_{fw})h \qquad (20\text{-}11)$$

is the rest energy part and

$$h_{kinetic}=(v_{fw}/c)h \qquad (20\text{-}12)$$

is the kinetic energy part of the Planck constant—in the case of light and seen from our Space.

Physics has defined neither Eq. (20–11) nor Eq. (20–12) previously. If $h_{rest}=h_{kinetic}$, then the speed of the light is c; Planck's law remains untouched if $v_{fw}=c$. If $h_{rest}=h_{kinetic}$, then we speak about a "normal" photon.

If $h_{rest}>h_{kinetic}$, we are speaking about particles with mass i.e. fermions. If $h_{rest}<h_{kinetic}$ we are speaking about fast waves. Both photons and fermions (e.g. electrons) can realize the tunneling process. We cannot measure their fast waves via tunneling as yet, so we cannot measure either h_{rest} or $h_{kinetic}$.

h_{rest} and $h_{kinetic}$ force us to accept that particles have structure. Studying h_{rest} and $h_{kinetic}$ is the second method how to distinguish two inertial frames of reference. Note there is a symmetry, both space and matter indicate the different between the inertial frames, if

$v_{in\text{-}fr1}\neq v_{in\text{-}fr2}$.

21. HIDDEN STRUCTURE OF ELEMENTARY PARTICLES

Today's physics does not use the expression 'rest energy', just 'rest mass'. As the speed of the object is increased, the inertial mass of the object also increases, while the rest mass remains unchanged. In the given inertial frame of reference, the value of the rest mass of an object cannot change[58, 59].

The fast wave-wave-particle triality shows that the 'rest action' h_{rest} exists also in the case of electrons and photons. According to above-mentioned, the 'rest action' h_{rest} can change in the given inertial frame of reference.

If the 'rest energy', 'rest action' reduces, how is it possible that the object remains the same? It seems that the 'rest action' is not the particle (wave) itself. What is the particle itself?

The dimension of h action is J·s=Js. Js is also the dimension of the angular momentum. In physics, angular momentum is the rotational equivalent of linear momentum. The changing 'rest energy part' of h is supposed to mean that the 'rest energy' of the elementary particle is created by a smaller unit of energy (action) that rotates inside the elementary particle. This smaller unit of energy is supposed to be the "information capsule or info capsule" of the elementary particle that defines the elementary particle as a particle. The distance from the center of the elementary particle changes depending on the velocity of the particle. The faster the particle is, the shorter this distance is. This makes possible that the 'rest energy' of the particle can decrease and increase without changing its information.

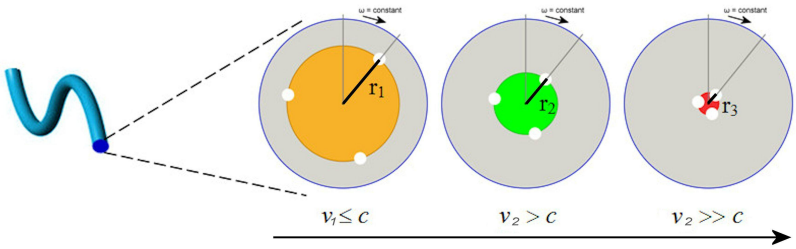

FIG. 21-1 There are one or more info capsules in elementary particles.
In fermions and in bosons. Although the info capsules of different particles contain different amounts of information, their working method is the same. First they store the main features of the particle. Secondly the info capsules change the rest energy of the particle. Their working mechanism is like a centrifugal governor reversed. Here $r_1>r_2>r_3$ if $v_1<v_2<v_3$. They rotate in a given direction at velocity ω. ω=constant.
This structure allows reducing and increasing the 'rest energy' of the particle while the unchanged info capsule holds the same amount of information continuously.
Two dimensional Model, not proportional.
(Credit © Dr. T. Lajtner Die messbare Kraft der Gedanken)

The rotating info capsule contains the whole information about the particle. On the other hand it is like a gyroscope. The particle seems to have a compass, which regulates the position of the particle. We know the gyroscope-like effect in particles, it is the spin of the elementary particle. In quantum mechanics spin is an intrinsic form of angular momentum carried by elementary particles.

The SI unit of spin is Nms=Js, e.g. the value of the spin of photon is $h_{spin}=1.5\cdot10^{-34}$ Js.
Spin has a magnitude and a direction, and it is a vector-like quantity as it was said earlier. According to my hypothesis the rotation of the 'rest energy' and the "information capsule" are connected with the spin of the elementary particle.

The dimension of the information capsule is Js or eV/c^2.

The axiom of elementary particles have no structure is out of order. (No. 10)

22. MOTION INDICATOR OF PARTICLE

$$ő=h_{kinetic}/h_{rest}, \qquad (22\text{-}1)$$

where ő is the motion indicator of particle. The pronunciation of ő is ɜ: (like her).

Value ő is the indicator of the moving of the particle showing the effect of matter-space on light's action, or in other words the effect caused by $v_{fw}>c$ on light's action.

From Eq. (22–1), we know how fast the particle travels—compared to the given space. It means that we are able to detect that our inertial frame of reference moves without using other inertial frames of reference. If we study the ő of an electron or photon of our inertial frame of reference, we can expect how fast our inertial frame of reference moves in the given space. Comparing values of two ős of two different inertial frames of reference, we are able to say which system is the moving one.

Topic	Experiment 1	Experiment 2	Experiment 3	Note
Motion indicator calculated in Space-Matter Theory				
$ő = \frac{h_{kinetic}}{h_{rest}}$	22.11	73.14	6.58	motion indicator

Table 22-1 Light's motions indicators in three experiments.

How does ő work in the case of masses? Masses travel in Space at velocity $c_{space\text{-}m}=c$, which is unchangeable. How can ő work in this case? ő works, because the wavelengths of Space waves change. That is the density of Space changes, in turn ő also changes.

ő shows that the Planck constant has a close connection to the special theory of relativity. If $ő<1$, that is $h_{kinetic}<h_{rest}$, so ($v_{fw}=v<c$), we can write the well-known formula this way:

$$(1–(v^2/c^2))^{1/2}=(1–ő)^{1/2}=(1–(h_{kinetic}/h_{rest}))^{1/2}, \qquad (22\text{-}2)$$

As mentioned earlier there is a discrete jump in the velocities of the tunneling electron. Eq. (22–2) shows that there *must be* a discrete jump in the velocities of masses if they leave Space, because if ő=1, we speak about light travelling at *c* velocity in space. If

$$ő>1, \qquad (22\text{-}3)$$

then mass has a new form called fast wave.

The discrete jump at this "big" scale is unexpected, but we of know other surprising discrete jumps like this. Physicists at the Ludwig-Maximilians University and the Max Planck Institute of Quantum Optics in Germany created an atomic gas in the laboratory that had negative Kelvin values. These negative Kelvin values came into existence out of positive Kelvin values. The atomic gas had no zero Kelvin value. There was a discrete jump on the Kelvin scale[60].

If a particle with mass (e.g. electron) or without mass (e.g. photon) has a $superluminal_M$ velocity, then ő>1. In this case we speak about fast wave without measurable mass. This fails to work without changing spaces.

ő works in every particle. ő changing can be seen as the mirror of changing wavelengths of a space wave, that is here can we find a new kind of symmetry. Because of this symmetry light has to create space waves i.e. gravity is occurred by light, too. Older axioms of gravity are out of order. (No. 11)

23. NO GENERAL CAUSALITY WITHOUT SUPERLUMINAL VELOCITY

In tunneling fast wave travels at $v_{fw}>c$ from our viewpoint. v_{fw} is a superluminal velocity measured. It is no theory;, it is a fact. And it is a problem at physics, because according to Special Relativity faster than light velocity destroys the general causality. This view, i.e. nothing is faster than light, is the essence of the theory of relativity. See the draft of Minkowski geometry of Special Relativity in FIG. 23–1. This geometrical explanation will be shown why fast waves do not work—in this theory.

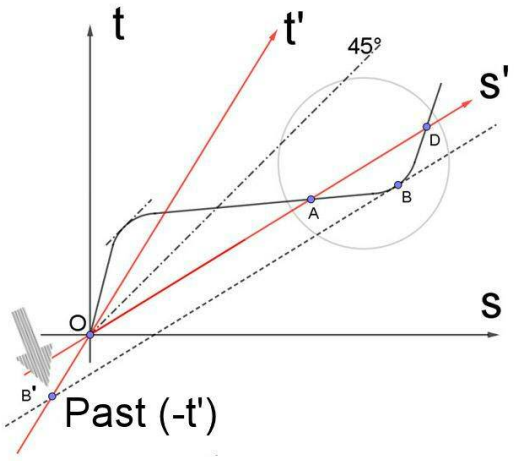

FIG. 23-1 No superluminal velocity either in special or in general relativity.
t and s and t' and s' are expressed in meters. According to Minkowski geometry of Special Relativity superluminal velocity in the st coordinate system is a time travel in the past in the s't' coordinate system. According to s't' events between AB and BD are in the past. Superluminal velocity in one system (e.g. st) is time travel in another system (e.g. s't'). B in st is B' in s't' and B' is in the past in s't'. B' contradicts general causality. Therefore in special (and general) theory of relativity, it is not possible to display an event at superluminal velocity.

According to the above mentioned, we cannot picture the fast wave in FIG 23–2.

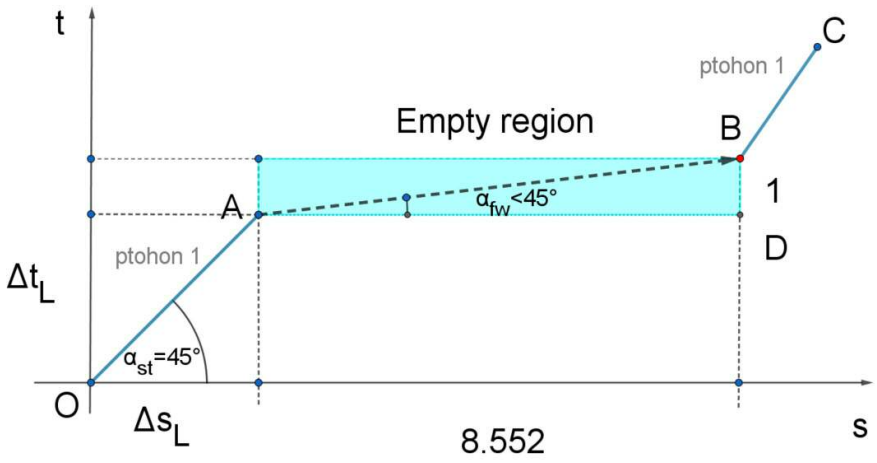

FIG. 23-2 Event OA and event BC are not connected.
Event OA is the path of photon1 before tunneling. Event BC is the path of photon1 after tunneling. The dashed arrow cannot be pictured in the Special Relativity, therefore event BC has no cause in the theories of relativity. The blue (grey in print) area is an empty area in the Special Relativity.
Superluminal velocities are fact, Theory of Relativity is a solid theory. Now fact and theory seem to contradict each other. Are they really in contradiction? Yes and no.

According to the Special Relativity fast wave AB does not exist in st. Saying this, event BC has no reason in st and nowhere else according to this theory. Therefore event BC remains a mystery, since it cannot originate from event OA. But in reality it does.

The main problem is that photon1 creates OA, AB and BC events. Without AB BC could not exist. But photon1 cannot be at point B within the given time period according to the theory of relativity. The theory is incomplete, because photon1 creates BC. Where is the part of Theory of Relativity that describes this? Nowhere.

Why? Because the Theory of Realtivity supposes one time and one space called spacetime. In spacetime there is no superluminal velocity. The theory is acceptable, but the sequel is missing: Where are the particles that travel at superluminal velocity?

23.1. More than one space

Superluminal velocities exists, therefore there are more spaces and more times not only the space and time of spacetime. In these spaces particles travel at superluminal velocity v>c—from our viewpoint. These are not mentioned either in Einstein's theories nor in modern physics at all. But these spaces exist, since tunneling exists.

In modern physics it is supposed that there is only one spacetime. Everything occurs only in this only spacetime. And this is false. In tunneling AB event happens in the barrier i.e. not in spacetime but in a different space, in a matter-space. Matter-space is not the spacetime. Different spaces mean different coordinate systems. In plain English, we need more spaces and times, therefore more coordinate systems to present the superluminal fast wave. The coordinate system of the matter-space is s't'. s't' is different from st.

In FIG. 23–3 there are two different spaces and two different times, pictured in two different coordinate systems.

The initial assumption was that points A and B should be connected by the matter-space marked with light red (light grey). We know about these points that the photon leaves st at the point A and returns to st at point B. The matter-space must connect A and B. We do not see into the matter-space, but we assume that the direction of travel of the fast wave is straight.

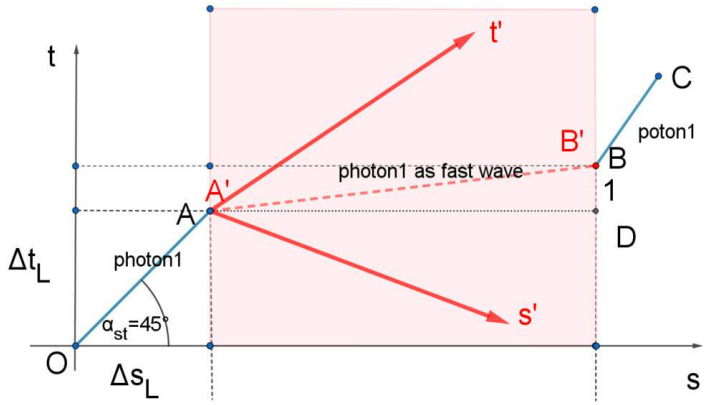

FIG. 23-3 Two different spaces, two different coordinate systems.
t, s and t', s' are expressed in meters. Two-dimensional model.
Using a system like this we can calculate the data of superluminal spaces and fast waves.
(Credit ©. Lajtner, Lajtner.com)

23.2. No general causality without superluminal velocity

Fast waves exist in s't'. Although the event A'B' is not in the frame of reference st, it is the reason of BC. Shall we handle matter-space as $spacetime_M$? Space and time can be connected as spacetime in our calculations, but we have to talk about several spacetimes, although physics has known only one spacetime until now. To avoid the misunderstandings there is a better solution. We can use our old terms like spaces, times and matter adding to them new terms like fast wave, matter-space, etc. Or we can even suppose:

$$Matter\text{-}space+time=spacetime_M.$$

Where $spacetime_M$ is a space made of matter and its time. Matter-space does not exist as space without travelling particles in it. It exists as matter-space as long as the particle travels in it. After and before it is merely matter. So it does not have time without travelling matter in it. Time will be created by travelling particles. Time – as always – is the action-reaction of matter and space (matter-space).

$Superluminal_M$ velocity (and even other superluminal velocity e.g. $superluminal_{EMB}$, see later) cannot destroy general causality in Space-Matter Theory, since time travel is impossible here, because time is the "cooperation" of space and matter. General causality remains untouched in both in theory and in praxis. As it has actually been measured, $superluminal_{EMB}$ and $superluminal_M$ velocities exist. These velocities do not and cannot violate general causality[61].

What is more the general causality is broken without superluminal velocities and additional spaces and times. Superluminal velocities are the explanations of many unexplained phenomena, e.g. BC has no reason in st. Its reason is in s't'. The axiom that superluminal phenomena destroy general causality is false. (No. 12)

24. RELATIVITY SUPERLUMINAL$_M$

Our Space has the shortest basic units. Every matter-space has longer basic units. Therefore traveling particle in matter-space seems to travel at superluminal velocity from our viewpoint. Seeing FIG. 24–1, we will understand immediately why every matter-space is faster than our Space.

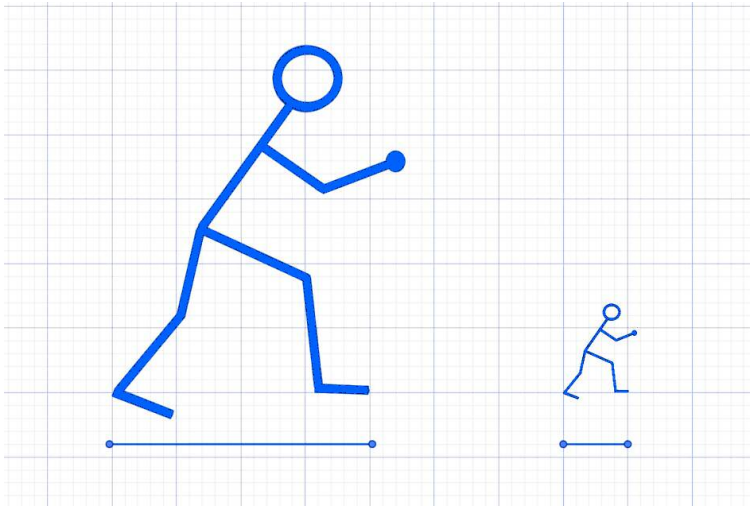

FIG. 24-1 The same step, a different country.
A step in the country of giants is longer than in the country of dwarves.

The giant in FIG. 24-1 is in the matter-space. E.g. the length of the barrier is one step according to him. The dwarf is in our Space. He thinks the length of the barrier is four steps long. The two men have the same size in the same space. (This model is not proportional.)

The units of matter-spaces are different from the unit of our Space. Its reason is that the wavelengths of waves of matter-space λ_{ms} are longer than the wavelengths of Space waves λ_{Sp}. $\lambda_{ms}>\lambda_{Sp}$.

So the same distance can be built out of less λ_{ms} than λ_{Sp}, $s=k_{ms}\,\lambda_{ms}$ and $s=k_{Sp}\,\lambda_{Sp}$ and $k_{ms}<k_{Sp}$. The distance in matter-spaces is shortened; there is a kind of length contraction in any matter-space compared to our Space. Actually the length contraction is a length dilation studying the wavelength of space waves, $\lambda_{ms}>\lambda_{Sp}$.

Note different matter-spaces have different units of distance, see FIG. 24-2. For the same reason a given time period contains more Space time units than matter-space time units, i.e. there is a kind of time dilation in matter-spaces which is also real. The shortest time unit of any matter-space is longer than a time unit of Space. This is a real difference it is not a relativistic viewpoint.

In FIG. 24-2 there are two different matter-spaces.

24.1. Units of superluminal$_M$ spaces

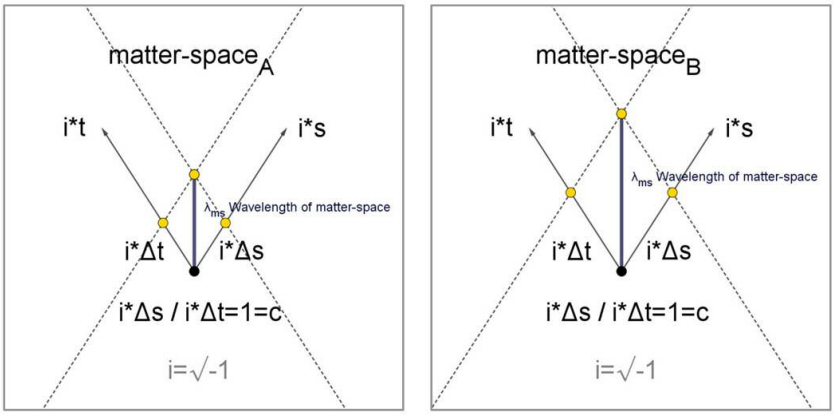

FIG. 24-2 Different wavelengths of "space" waves in two different matter-spaces.
Every *t* and *s* are in meters. This figure is similar to FIG. 17-2 and 15-1 at first sight, but differs significantly from them. We cannot enter these spaces, therefore the notation i=√-1 is used.
Here there are coordinate systems of two different matter-spaces.
These coordinate systems show that particles create constant velocity in any matter-space, $i\Delta s_A/i\Delta t_A=i\Delta s_B/i\Delta t_B=1$ and c=1. The velocity of a particle is always c from the viewpoint of the given matter-space and from the viewpoint of the given particle travels in the matter-space.
(Model, not proportional.)

Here is a short outline how to handle fast waves using special relativity. Now instead of the special Minkovski-geometry, we may use Euclidean coordinate system, where the essence of special relativity, the Lorentz-transformation[62] was created.

Let us recall Eq. (15-7). It claims that mass travels in its Space at velocity c measured by Space waves modified by mass. This is the only velocity of masses in Space. Photons travel in its space at c. We know there are electrons aside photons in tunneling. In tunneling each particle travels at the same velocity. Since electrons and photons travel in their own spaces at velocity c, they also have to travel during the tunneling in matter-spaces at c. Presumably they use the only speed they know: c. Every particle travels at c in any space from the viewpoint of the given space and the given particle.

In barriers of tunneling experiments fast waves travel at $c_{Exp\text{-}i}=c$. This velocity seems to be a fast wave from our viewpoint, but it is c from the viewpoint of the given matter-space. Saying this, there must be different basic units in matter-spaces.

FIG. 24–3 uses the data of Experiment 2 and shows an easy-to-understand solution. The three-dimensional model is only an example of st and s't' that helps understand the concept. s'= s·i, t'= t·i, where i=√-1.

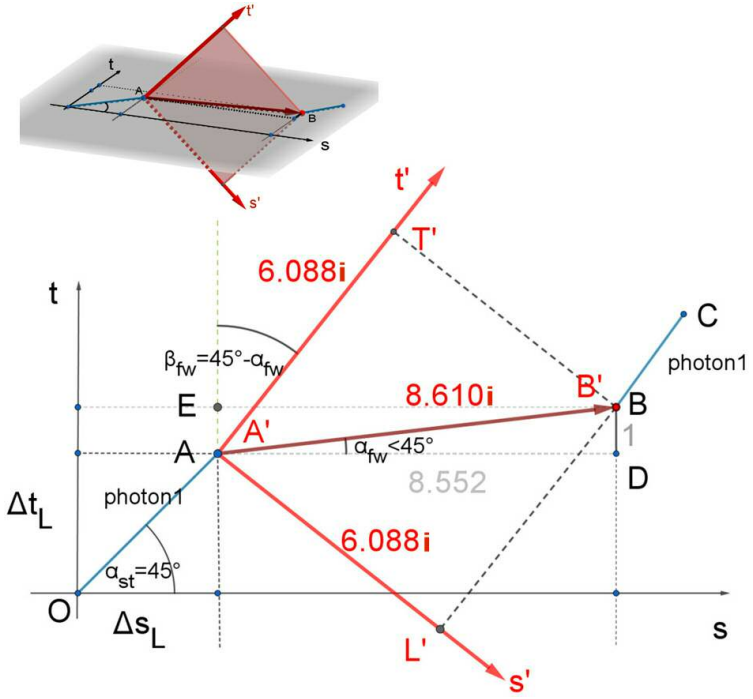

FIG. 24-3 $v_{fw}>c$ velocity appears as c in matter-space st.
In the model st and s't' are two dimensional spaces with different units.
st is the coordinate system of Space, s't' is the coordinate system of matter-space.
Region AEBD is not interpreted from the viewpoint of photon1. As mentioned above, points A and B have no connection in st. A and B are connected in s't' using A' and B'. s't' is a fast space, where the unit distance and time unit are different from the units of st.
Time $unit_{st}$=1 m. Time $unit_{s't}$=6.088 m expressed in st units. The time unit in matter-space is longer. This result was expected. On the other hand, this particular number shows that the matter-space contains only one space wave. If it were not so, the time would have to be shorter in matter-space. The unit distance in matter-space is longer than the unit distance in Space, therefore the calculated length (6.088) is the length of the matter-space.
FIG. 24–3 contains more details not stressed here that can help you to understand the table below. Note st and s't' are connected only in two points. A is connected with A', B with B'. There are no more connections between st and s't'.

We have a superluminal wave1 from the viewpoint of st, and a photon1 that travels at c in matter-space. We can "observe" the same photon1 from two different viewpoints. (Fast waves cannot be directly observed.) And we can calculate the units of matter-space, and we can calculate what st might look like from the matterspace.

Using Eq. (24-1, 2, 3, 4) the Table 24-1 can be filled out.

$$ú=v_1/v_2, \qquad (24\text{-}1)$$

where $v_1>v_2$, e.g. $ú=v_{fw}/c$.

$$ó=(-1(ú^2+1^2)/2)^{1/2} \qquad (24\text{-}2)$$

$$L'=L\cdot(ó/ú). \qquad (24\text{-}3)$$

$$T'=T\cdot(ó/1). \qquad (24\text{-}4)$$

In Table 24−1 it is supposed that the barrier consists of a single wave as matter-space $L'=\lambda_{ms}$, and the fast wave uses this one.

Topic	Experiment 1	Experiment 2	Experiment 2	Note
Measured in Space's units—from our viewpoint				
ú	4.702	8.552	2.565	$ú=v_{fw}/c$, c=1
$ó = i\sqrt{(ú^2+1^2)/2}$	3.399 i	6.088 i	1.947 i	conversion factor (without dimension) $i=\sqrt{-1}$
L	$1.142\cdot10^{-1}$	$3.00\cdot10^{-1}$	$1.00\cdot10^{-1}$	length of the barrier (m)
T	$8.1\cdot10^{-11}$	$1.17\cdot10^{-10}$	$1.30\cdot10^{-10}$	tunneling time (sec)
Matter-space from the viewpoints of fast wave and matter-space—in our units				
$L'=L\cdot(ó/ú)$	$8.26\cdot10^{-2}$ i	$2.14\cdot10^{-1}$ i	$7.59\cdot10^{-2}$ i	the shortest spatial unit = the length of matter-space (m)
$T'=T\cdot(ó/1)$	$2.75\cdot10^{-10}$ i	$7.12\cdot10^{-10}$ i	$2.53\cdot10^{-10}$ i	the shortest and only time unit in matter-space (sec)
$v'_{fw}= L'/T'=c$	c	c	c	speed of fast wave in matter-space (m/sec)

Table 24-1 Tunneling time and the length of the barrier from different viewpoints.
Different matter-spaces have different time- and space units. Let us see the values of Experiment 2. The length of the matter-space is as long as λ_{ms} . It is $3.00\cdot10^{-1}$ meters from our viewpoint, inside the matter-space it is $2.14\cdot10^{-1}$ meters. The tunneling time is $1.17\cdot10^{-10}$ sec from our viewpoint, inside the matter-space it is
$7.12\cdot10^{-10}$ sec.
The observer in matter-space is able to calculate L and T.
$L=L'/(ó/ú)$. $T=T'/(ó/1)$

The time wave of matter-space must be faster that c. What can be faster than c? E.g. a group wave in matter-space can be faster, therefore a group wave can be the time wave of matter-space, cf. fast light experiment and group waves mentioned earlier. Or time wave can be a longitudinal wave.

In Table 24-1 is not part of the theory of special relativity, although the changes of length and time seem to depend on particles' velocities. In reality, changes showed in Table 24-1 depend on the matter-space where particle is able to travel.

Let us step out of the spacetime of the special relativity. Unchained ourselves this way, we can build two different "bridges" between A and B. The first bridge is the tunneling.

The tunneling particle travels in matter-space at $c_{fw}=c_{matter\text{-}space}=c$. The barrier is a space$_i$ where units of time and spatial distance are different from time and spatial distance units of our Space and light's space. It means every space$_i$ has its own unit of time and spatial distance, if there is matter in

$space_i$. The given values depend on $space_i$ and the given matter that travels in $space_i$. $c_{space\text{-}i}$=c in every $space_i$, and matter always travels at c velocity in every $space_i$. If it cannot travel at c velocity in $spaces_i$, then the given $space_i$ is no space for this matter. This is not about a new method about how to change the speed of particles in our Space, and this is not about the Cherenkov radiation[63], it is about different spaces.

The second bridge is the coordinate system s_it_i that shows the velocity of information in st. Coming soon.

24.2. Velocities and the two parts of Planck constant

As written in Chapter 17.4. and also in Chapter 24.1. it seems to exist a fundamental law (according to my assumption): every object must travel in any space at velocity c. In plain English, there is only one velocity at which an object is able to travel relative to the given space. This velocity is c. In every space for every object made of matter or non-space.

Where is this constant? It cannot be in every space. It is the nature of matter. This constant velocity results from the nature of the Planck constant. The given space has its waves that have wavelength, frequency and action. These three features are not independent of each other. h_{space} can be thought of as a pressure that pumps energy (action) into the particles' "container" of $h_{kinetic}$. Bigger h_{space} pumps bigger portion of action into the particles' "container" of $h_{kinetic}$.

Our fundamental rule detailed in the earlier chapters is written in Eq. 24-5.

$$h_{matter\text{-}space} > h_{Space}. \qquad (24\text{-}5)$$

FIG. 24-4 artistically depicts Eq. 24-5.

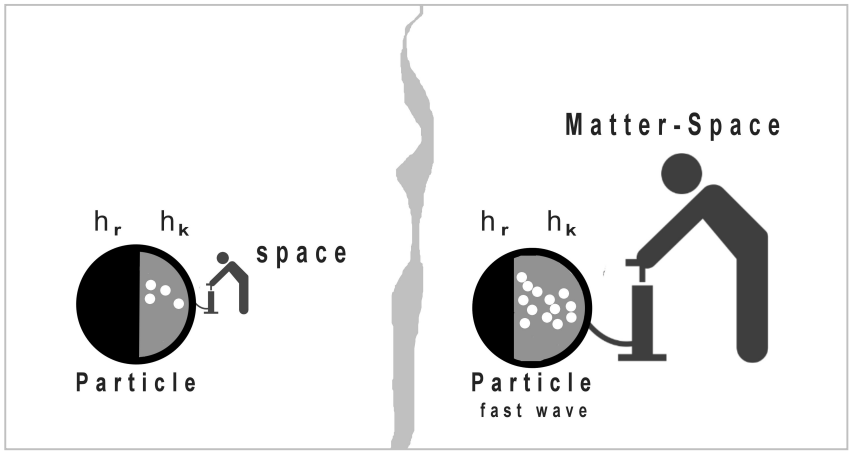

FIG. 24-4 Space and matter-space fill $h_{kinetic}$ into the same photon particle.
$h_{kinetic\text{-}s} < h_{kinetic\text{-}ms}$
Model, not proportional.
(Credit Particle inflated © T. Lajtner, Lajtner.com from Half full CC0 David Christensen from Noun Project, Edited, and from Air pump CC0 Luis Prado from Noun Project, Edited.)

The Planck constant is a constant of matter. Its value remains unchanged in every space. Since h_{rest}>0, therefore $h_{kinetic}$ cannot be infinite. So the $superluminal_M$ velocity has an upper limit.

As mentioned above, in tunneling there are two time periods: traveling time and time of two metamorphoses (wave↔fast wave). I think the real travelling speed is much higher than the speed of tunneling measured.

Until now we haven't measured values about the metamorphoses, so we cannot exactly

calculate the pure travelling time. So the values given above are correct according to today's measurements.

24.3. Relativity superluminal$_M$

Table 24–1 presents the calculated units of matter-spaces from the viewpoint of matter-spaces. How to calculate the distance of Space from matter-space?

The operation is the following. See FIG. 24–5.

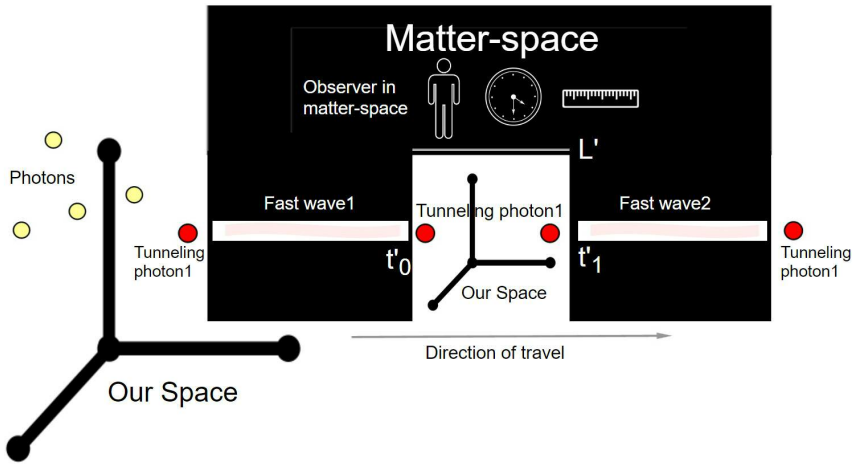

FIG. 24-5 Observer in matter-space.
In the following calculation will be supposed that the lack of the matter-space is as long as the length of the barrier in the tunneling experiment.
(Model, not proportional.)
(Credit © T. Lajtner, Lajtner.com)

The observer in matter-space cannot see and measure the photon outside the matter-space. He can measure time t_0 when the photon1 as fast wave1 leaves the matter-space, and time t_1 when the photon1 as fast wave2 re-enters the matter-space. Actually not by entering but when the photon1 had traveled L' distance in the matter-space.

Important! The observer in matter-space is not able to measure any part time that is shorter than the shortest time unit in his matter-space. So he will measure ú=9 instead of ú=8.552 measuring photon's time t_2. In my following calculation I calculated with ú=8.552, because I did not want to go into small details that can be confusing.

He can also measure the length of the lack in matter-space L', see FIG. 24–5. Therefore he is able to calculate the velocity of photon1 in light's space using L' and t_1-t_0. From the viewpoint of matter-space the velocity of photon1 in st will be calculated slowlier than c. Now the observer compares the $c_{fast\text{-}wave}$ and the v_{photon}. $ú=c_{fast\text{-}wave}/v_{photon}$.

He knows that the shortest wavelength of photon's space st must be shorter than L'. It is not the same, since ú≠1. It cannot be longer, because in this case it would not fit into L'. Knowing ú and the above mentioned the calculation works vice-versa. (Of course, he cannot calculate the shortest wavelength of our Space.)

Table 24–2 contains the details.

Topic	Experiment 1	Experiment 2	Experiment 3	Note
Photon1 from our viewpoint				
λ_0	$3.45\cdot10^{-2}$	$3.01\cdot10^{-2}$	$3.45\cdot10^{-2}$	wavelength of photon1 before tunneling (m)
f_0	$8.7\cdot10^{9}$	$9.97\cdot10^{9}$	$8.7\cdot10^{9}$	frequency of photon1 before tunneling (1/sec)
$v_{photon1}$	c	c	c	speed of light (m/s)
Fast wave1 in matter-space from the viewpoint of matter-space– in our units				
$\lambda'_{fw}=L'$	$8.26\cdot10^{-2}$ i	$2.14\cdot10^{-1}$ i	$7.59\cdot10^{-2}$ i	wavelength of fast wave1 during tunneling (m)
$f'_{fw}=1/T'$	$3.63\cdot10^{9}$ /i	$1.40\cdot10^{9}$ /i	$3.95\cdot10^{9}$ /i	frequency of fast wave1 during tunneling (1/sec)
v_{fw1}	c	c	c	speed of light (m/s)
Photon1 in our space from the viewpoint of matter-space				
$v'_{photon1}$	$6.38\cdot10^{7}$	$3.51\cdot10^{7}$	$1.17\cdot10^{8}$	speed of photon1 according to the observer in matter-space (m/s)
$ú$	4.702	8.552	2.565	$ú=c/v_{photon1}$

Table 24-2 The velocity of photon1 depends on the space of the observer.

The velocity of photon1 in our Space is less than c according to the observer in matter-space. In Experiment 2 it is $3.51\cdot10^{7}$ m/s. From our viewpoint its velocity is c. ($v_{photon}=3.51\cdot10^{7}$ m/s$<2.99\cdot10^{8}$ m/s=c.) The frequencies and the wavelengths of the same photon are also different in different spaces. The smaller number in the frequency of the fast wave does not mean that a part of photon's energy is lost.

The energy of fast wave E_{fw} is expressed in units of matter-space and it seems to be immeasurable, since f'_{fw} is an imaginary number, look at it in Table 24-2. Here the conservation of energy is to understand in a wider meaning, where the additional energy of matter-space caused by fast wave is also to calculate with.

$$(E_0=h\cdot f_0)\equiv(E_{fw}=h\cdot f'_{fw}+E_{m\text{-}s}),$$

The observer in the matter-space can calculate the velocity of fast wave1 from the viewpoint of st.

$$v_{fw\text{-}st}=ú\cdot c.$$

24.4. Superluminal$_M$ information

Here comes the second bridge. It is the coordinate system s_it_i that shows the superluminal velocity of information in s_it_i. See FIG. 24–6.

FIG. 24-6 Superluminal$_M$ information.
Every axis is in meters. Data of Experiment 2. Two-dimensional model.

Information can be sent from space1 into space1 without using traveling particle in space1. The photon1 disappears from space1 and reappears in space1. If the disappearance of a photon1 is the first information and the reappearance of a photon1 is the second information, then Information1 is no more valid and Information2 is valid. There is a change in information.

Note the information does not travel at all in space st. In st there are two points of the change of information. It has its start point: the photon1 disappears. And it has its end point: the photon1 reappears. If the distance and the time between the disappearance and reappearance of photon1 are measured, superluminal velocity will be given. In this sense, the superluminal$_M$ information is a real phenomenon. $v_{information}>c$. This can be pictured in the coordinate system s_it_i that shows the causal relationship between OA and BC, explaining the empty range of st.

Relativity superluminal$_M$ makes it possible to compare different spaces and the behaviors of particles in these spaces. It allows displaying superluminal$_M$ velocities. It is a new instrument to work with.

24.5. Rocket propulsion of photon?

Let us study the data of Table 24–2. The light (photon) has frequency f_0 before the tunneling. During the tunneling it has f_{fw}. $f_0 \neq f_{fw}$. After tunneling it has f_0 again cf. Ref 50.

We understand the change of f_0 into f_{fw}. In the matter-space the wavelength λ_{fw} is given. c is given, therefore the frequency of photon1 must be the following: $f_{fw}=c/\lambda_{fw}$.

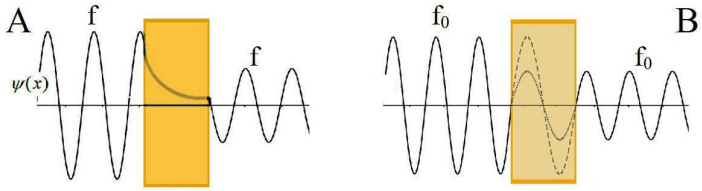

FIG. 24-7 We do not know what happens inside the barrier.
ψ(x) is the wave function of tunneling particles outside the barrier. f is the wave packet frequency. f_0 is the frequency of one photon.

I display FIG. 24-7 A and FIG. 24-7 B here, because at first glance you can see the significant difference between the two explanations.

FIG. 24-7 A shows the most popular idea that tries to explain tunneling by using refractive idex cf. Chapter 17.1 and by the evanescent modes based on Schrödinger equation not detailed in this book.The tunneling particle and the evanescent modes are not observable; the explanation is based on calculation. The evanescent mode explanation violates the Special Relativity states Ref. 50, therefore either the Special Relativity or the evanescent mode explanation is false. FIG. 24-7 shows a different explanation: the Relativity Superluminal$_M$. Here the Special Relativity remains true; therefore, Relativity Superluminal$_M$ seems to be a useful model.

But how does the photon restore its original f_0 frequency entering its own space? The only way to do this, using its stored frequency level described in Chapter 17.3. If the frequency level can be stored, it means that photons and other particles e.g. electrons have structures. In other words: they work.

Let us remember Nimtz's remark mentioned in Chapter 19.1. The tunneling particle spends zero time inside the barrier. Using the model of Relativity Superluminal$_M$, we can explain why this statement is right and misleading at the same time. The shortest length unit in matter-space is λ_{ms}. The length of the barrier is $L'=\lambda_{ms}$. As long as the particle has not made the full L', it does not travel any distance, because there is no shorter distance than λ_{ms} in the given matter-space, since $L'=\lambda_{ms}$.

Why does photon seem to wait in the front of the barrier? Because it does wait. It must be charged with energy.

Photons seem to work like jellyfishes. A jellyfish fills its "body" with water and then it presses the water out of itself. It is like the rocket propulsion. See FIG. 24–8.

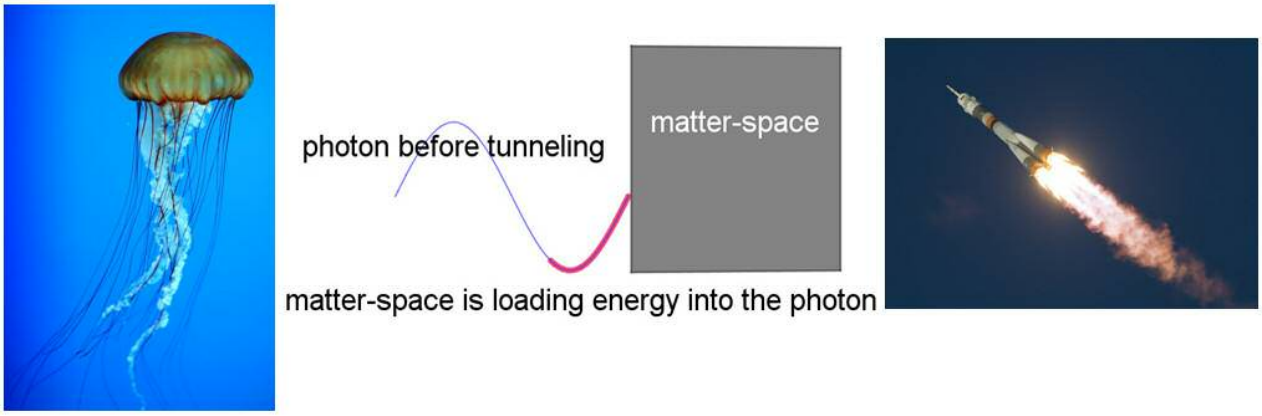

FIG. 24-8 Rocket propulsion of particles?

(Credit Rocket propulsion of particles CC BY 4.0 T. Lajtner, Lajtner.com from Jellyfish CC0 TDesigns, Pixabay, edited; Rocket CC0 skeeze, Pixabay)

I think, the photon must fill its $h_{kinetic}$-container before it can enter the matter-space. The photon can act as fast wave, if its container contains $h_{kinetic\text{-}ms}$ action. If the photon is charged with $h_{kinetic\text{-}ms}$ energy, it travels as fast wave inside the barrier i.e. in the matter-space. The matter-space has only one unit of distance, therefore the fast wave has only one wave period here. During the travelling, fast wave gives the energy (action) back to the given space. If it enters as photon into its own space, its own space fills $h_{kinetic\text{-}s}$ into the photon's container.

$h_{kinetic\text{-}ms} > h_{kinetic\text{-}s}$. This is why photon can travel as fast wave.

The photon moves in its space, therefore it gives back the energy to its space. Electrons as fast waves seem to work the same way. Energy given and given back. It is an endless cycle. Spaces continuously reload the photon, and the photon gives the energy continuously back by moving in the given space.

To and fro. To and fro. To and fro.

The flow of energy form space to matter and back is a fundamental law. Therefore the model of growing mass described in Chapter 15.2. is a working model. The accelerating mass grows, because its additive growing mass originates from the space i.e. from the growing wavelengths of space wave. If the acceleration is negative, the process works backward[h].

[h] Knowing this, do we really need the Higgs boson?

25. PROBLEMS OF LIGHT CONES

25.1. No-man's land in theory of relativity

As several times mentioned above, in Theory of Relativity it is impossible to handle superluminal phenomena. Fast waves and space waves that have superluminal velocities are unwelcome in relativity and in academic physics. By this Theory of Relativity and the academic physics ab ovo abandon the ambition of exploring a big part of the world.

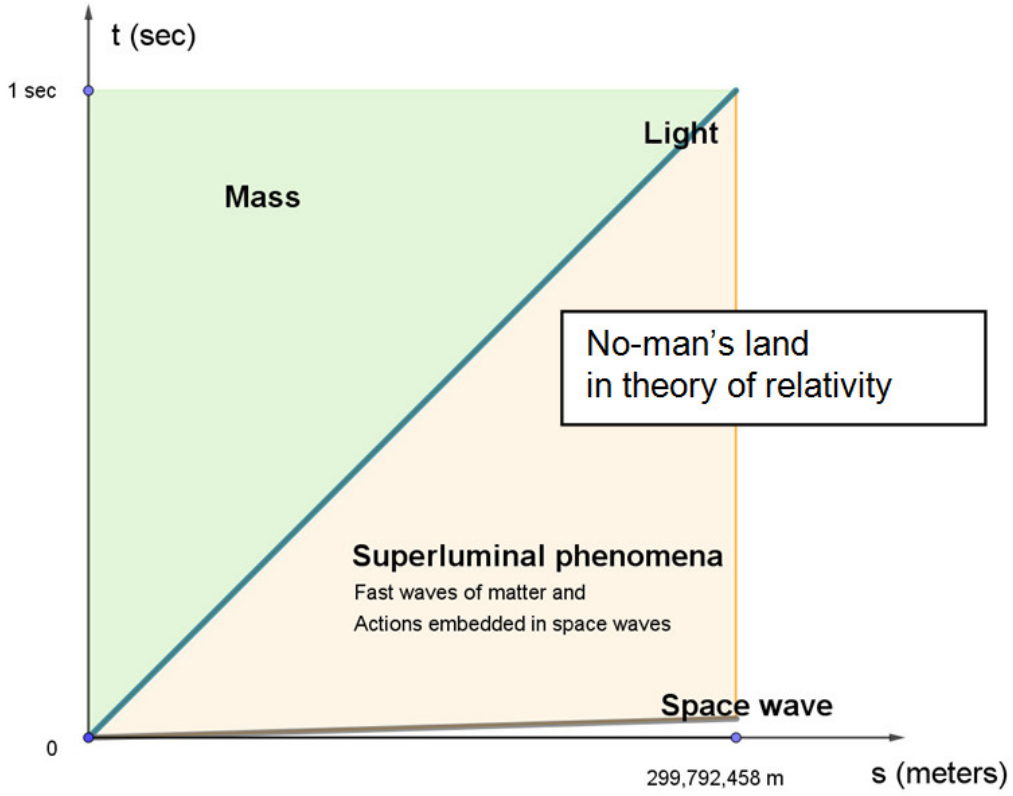

FIG. 25-1 No-man's land in theory of relativity.
In the picture there are velocities of mass, light and superluminal phenomena that exist in reality. The velocities of space wave and the velocity of light cannot be displayed proportionally in the same coordinate system using linear scale, because the speed of space waves is several orders of magnitude faster than light. Space waves have the highest speed in our Universe, its speed is over-superluminal. Model, not proportional.

25.2. Distortion of light

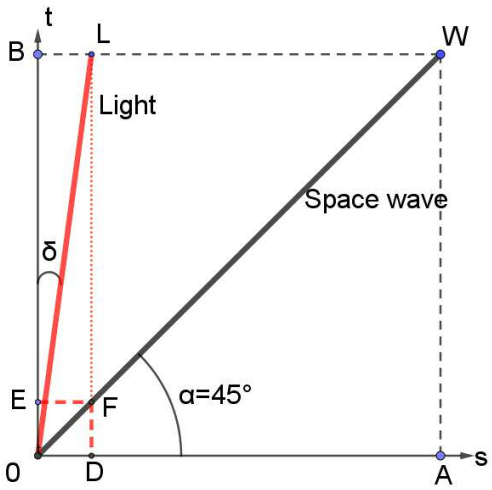

FIG. 25-2 Coordinate system of Space wave.
t and s are spatial coordinates expressed in meters. Data given by Cosine-model.
The scale of the coordinate axes is logarithmic. D=$\log 10^{8}$, A=$\log 10^{8n}$ and n>1.
0B represents 1 sec. 0A represents the distance where Space wave travels one second. This is a very long distance, see my calculation in Appendix. α=45º shows the highest velocity. This is the over-superluminal velocity of Space wave. Result 0A/0B=1 originates from Space wave. It shows the nature of Space. In the coordinate system of Space wave light displays a different rate: 0D/0B≠1. This different relation is expressed in δ (delta). Delta contains both the nature of space and the nature of light. In our dally calculations we use the function 0D/0B=1 supposing δ=45º, remember FIG. 10–3. In reality δ<45º.

This is, why Minkowski geometry of Special Relativity does not allow us to display superluminal velocities. It uses the speed of light as general speed limit. Although this is right but it is wrong without mentioning the existence of different spaces.

Superluminal phenomena like fast waves and forces embedded in space waves appear in the triangle 0LW. These phenomena are several times faster than light, but their velocities are lower than the speed of Space wave, $v_{SupL}<v_{OverS}$. Information as force embedded in space wave is also slower than the velocity of space waves. Remember the velocities of spooky actions at a distance.

Knowing this, there is an absolute speed limit for every matter and every action of matter in every space(i). This is the speed of space waves of the given space(i). Therefore the space waves in every given space(i) must be faster than light in the given space(i).

Knowing that δ (beta) exists, and that it can have different values in different spaces, and δ<45º, we may use the velocity of light in different spaces to describe these spaces. Light is our general measuring instrument.

The distortion pictured by beta is a general attribute of matter. The distortion of matter is very important. It makes possible that the same Space waves appear as different counter (s) and denominator (t) in Newton's Second Law of Motion ($F=m\cdot s/t^2$), while we rotate the paper wheel by thought force.

25.3. Problem of light cones

The light cone plays an essential role in general and Special Relativity and in modern physics.

Event B can be influenced only by events that appear “not later” than B *in the given light cones*. This notion supposes that the future light cone and the past light cone are continuous and uninterrupted. Is this opinion correct?

In FIG.25–3 is presented the well-known future light cone in an unusual way. We know this is the area of particles that are described in the standard model of physics, there are no superluminal particles here. The future light cone is a part of the future space wave cone. Within the future space wave cones are the particles of the standard model and superluminal phenomena.

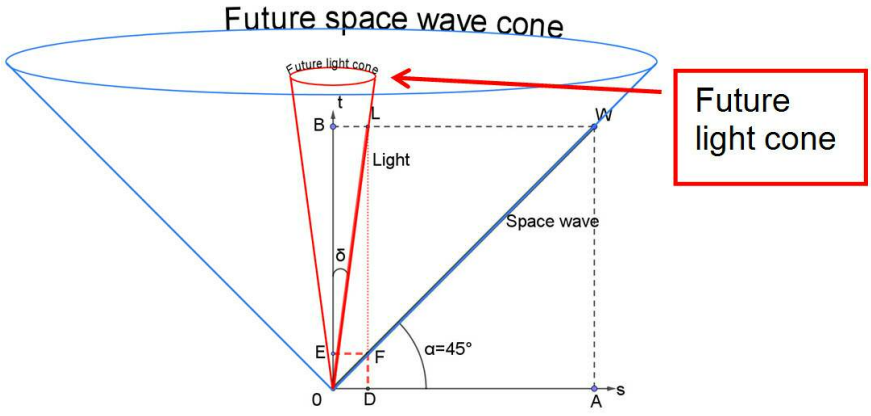

FIG. 25-3 Future light cone vs. future space wave cone.
Within the space wave cone superuminal phenomena also appear. The absolute speed limit is the over-superlunimal velocity of space wave.
(Credit © T. Lajtner, Lajtner.com)

Of course the past light cone and the past space wave cone can also be displayed. The ’hypersurface of the present’ is also visible in the following figure.

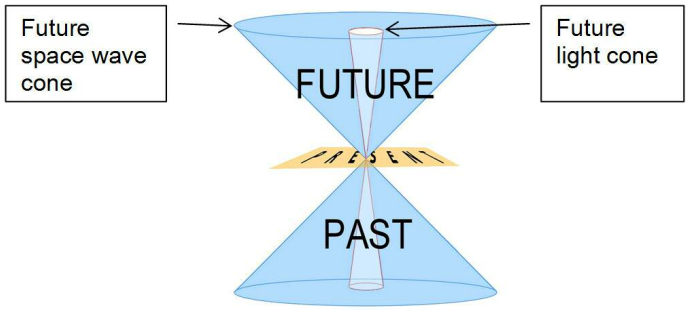

FIG. 25-4 Superluminal events of quantum mechanics
covered by the theory of Einstein’s relativity.
Relativity is not able to describe the whole part of the past that happened within the space wave cone. It uses only the past light cone, therefore many events do not exist at all according to this model. The same is true about the future cones. Model, not proportional.
(Credit © T. Lajtner, Lajtner.com)

What does the above-mentioned mean? It means the future light cone is one of the various different future cones. In case of superluminal velocities there are several cones e.g. fast wave future cone, embedded space wave future cone.

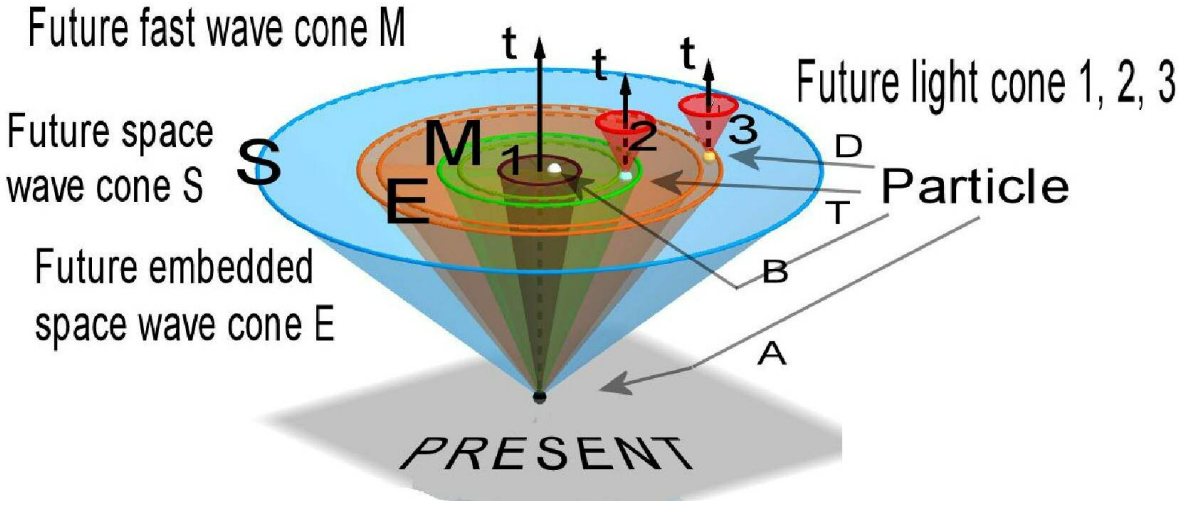

FIG. 25-5 There are more than one future cone.
Cones can be connected variously to each other.
Model, not proportional.
(Credit © T. Lajtner, Lajtner.com)

Particle A is in the present. In the most cases it remains in the light future cone 1 as particle B.

If Particle A in present is a tunneling particle, it will use the future fast wave cone M, and after tunneling it reappears as Particle T in the future. Now Particle A = Particle T. Here Particle T opens its own future light cone 2. There is a gateway from cone M to cone 2 and vice versa. This gateway is not continuous but of quantum nature. Particle A with mass travels at $v_1<c$ velocity in present, and the same particle as tunneling particle travels at $v_3>c$ from our viewpoint. Here with no mass. Particle A has never c=299,792,458 m/s velocity, while $v_1<c<v_3$. It skips velocity c. Saying this the future light cone is not continuous, it is not always appropriate to use and it can have interruptions. Our whole world seems to have a quantum nature changing different cones without transitions. The next quantum character is shown by the positions of the different cones. There are empty regions between them.

Cone E represents the cone of the spooky action. Here particle A and particle D are the photons of spooky action. From cone E starts the future light cone 3 that is created by Particle A and D.

Every future cone remains within the future space wave cone S.

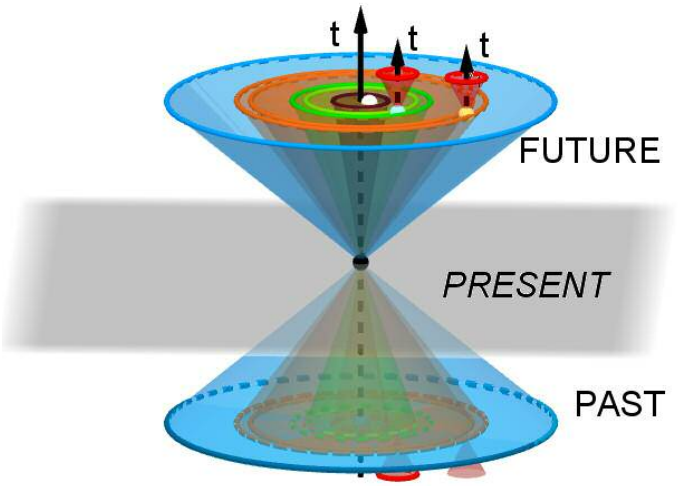

FIG. 25-6 There are several future and past cones.
Cones show quantum nature.
Model, not proportional.
(Credit © T. Lajtner, Lajtner.com)

Sooner or later the future light cones pictured in figures above will intersect each other. The origin of the past is not unequivocal.

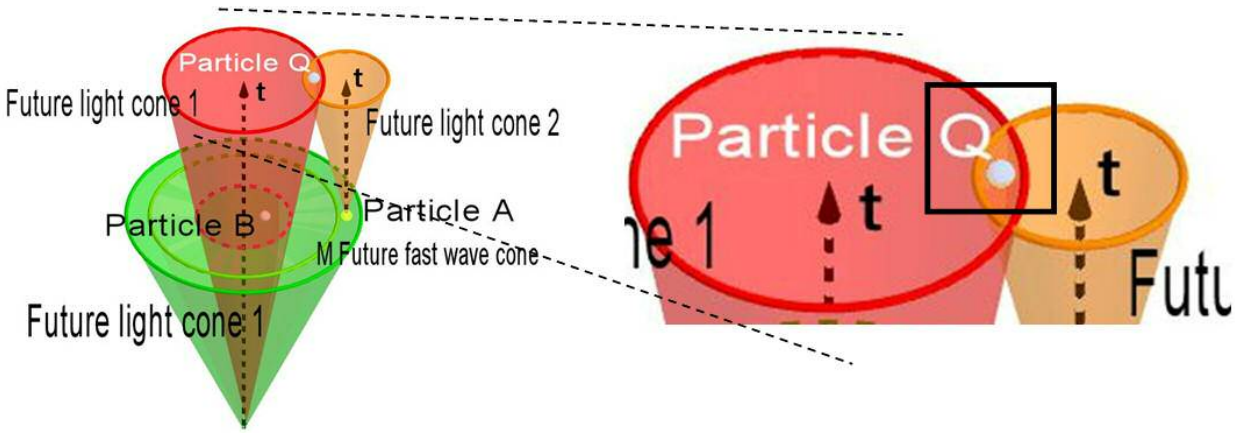

FIG. 25-7 Future light cone 1 and Future light cone 2 intersect each other.
Is Particle Q identical with Particle B or Particle A? Today's science tries to derive the Particle/Event Q from Particle/Event B, which is simply impossible if A is the ancestor of Q.
Model, not proportional.
(Credit © T. Lajtner, Lajtner.com)

The axiom of continuous and uninterrupted light cone is out of order. (No. 13)

26. PHENOMENA OF SPACE WAVES—GRAVITY CAUSED BY MASS, BY PHOTONS AND BY SPACE WAVES

26.1. Gravity is pressure

Gravitation is attraction. We all know that from Newton. However, the attraction is often not attraction. It just looks like that.

Let us see a well-known example from the history of physics. Otto von Guericke (1602 - 1686) discovered the air pump and this enabled him to pump air out of certain objects. He claimed that there was pressure by the air. To prove his claim, he put two hemispheres together, then pumped out the air from them. The two hemispheres really did not fall apart, the air pressure held them together.

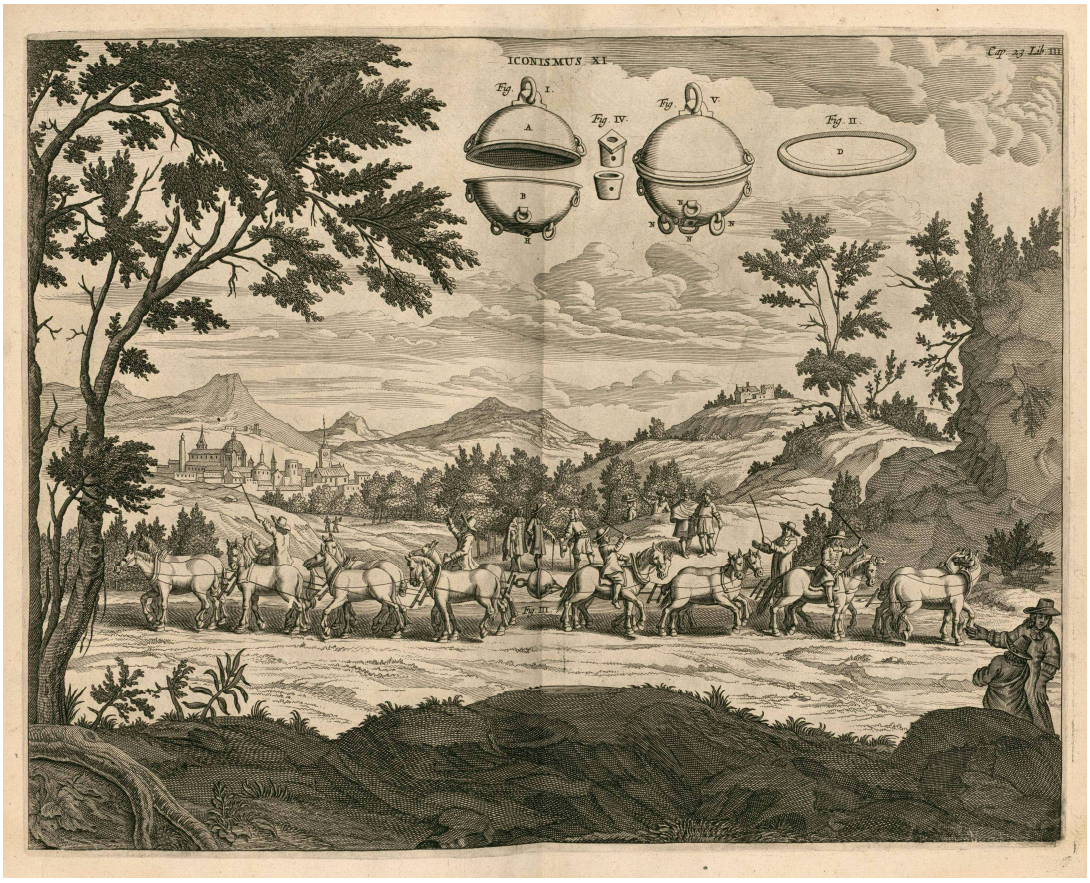

FIG. 26-1 Experiment of Magdeburg.
Sixteen horses played an important and spectacular ("marketing") role. The horses tried in vain to pull the two hemispheres apart. The experiment confirmed that air has a pressure and that it is quite high.
(Credit Public Domain © Gaspar Schott, Experimenta nova (ut vocantur) Magdeburgica de vacuo spatio, 1672, Wikipedia.org)

If we were not aware of what happened, we might think that the two hemispheres are attracting each other.

Well, we don't know what is going on in gravity. We feel an attraction, although it is possible that it is currently a pushing. In the Space-Matter theory, gravity is pressure of space waves. It occurs when space waves with different wavelengths push object(s) in any direction.

Gravitation is created between two (more) objects that are in the same space and their velocities are smaller than the velocity of space wave. $v_{object}<v_{space\text{-}wave}$. Objects are made of matter or non-matter, see later.

26.2. Gravity as difference of wavelengths of Space waves caused by masses

Gravity occurs when Space accelerates masses, see Eq. (26–1):

$$\sum F_{Space} \neq 0, \qquad (26\text{-}1)$$

where F_{Space} are vectors of the force of Space waves from the viewpoint of mass. Mass moves the direction of the resultant vector except in special cases not detailed here.

Among bodies experiencing gravity, the frequency of Space waves decreases. That is the Space "pressure" between the bodies decreases. Gravity arises because the portions of Space with higher force (action) shift the masses. If on one side of a mass Space wave has f_{S1} frequency, and on the opposite side of this mass Space wave has f_{S2} frequency and $f_{S1}<f_{S1}$, the mass goes into the direction of f_{S1}. The greater f_{S2} frequency—the greater force (action) of space moves the mass forward. This force will give the direction of the object moving in gravitation.

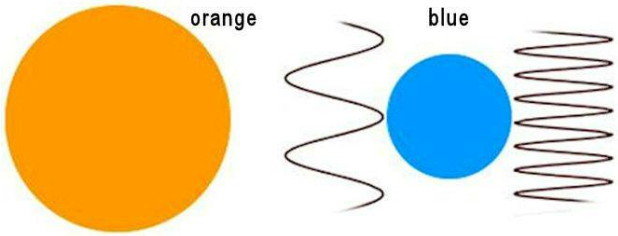

FIG. 26-2 Space wave model of gravity.
Gravitation occurs when space shifts. Model, not proportional.

The big (orange) mass makes the frequency of Space waves (time wave) smaller on the left side of the small (blue) mass. On the other side of the small mass, the frequency of Space waves (time wave) is greater. The greater frequency moves the mass forward.

Or even more clearly, although the statement may sound less scientific "You'll get a slap that sends you flying!" If the small planet gets four slaps from the right and one from the left, it will move left. Since Space waves are time waves from the viewpoint of masses, we can state that gravity occurs when time shifts.

The Space wave (set of Space waves) between the two (or more) objects can be seen as a communication channel with feedback. Space waves make possible that every object detects all movements of the other objects, and every object will give reactions, i.e. every action creates reaction.

Gravity is a kind of communication.

Gravity is created between two or more bodies. You have seen that one body without force acting upon will accelerate on its own.

Now Let us see FIG. 11–2. displayed earlier this way: a big mass is at "O" and a small mass is at "a". If the small mass is much smaller than the big one, so it does not significantly change the

wavelength of the Space wave, then from the viewpoint of the small mass the wavelength of the Space wave is an accelerator for the small mass, where $a_t=a_{t+1}$ and time t=1,2,3…

If the smaller mass changes the wavelength significantly, the accelerator effect of space remains untouched.

In case of two masses there are two sources of gravity waves. Both masses create waves. These waves between masses can form a standing wave. Gravity effects the same force for both masses. Standing wave seems to be a right solution.. See Newton's Law of Gravity and Einstein's geometrical spacetime. As mentioned earlier the modified wavelengths of Space wave generated by mass can be calculated using the density of mass, but a more detailed calculation is also possible using the stress–energy tensor $T_{\mu\nu}$ of general relativity. Using both methods, we can figure out how the elements of the stress–energy tensor modify the wavelength of Space wave compared to mass density. This method leads to "quantum relativity".

26.3. Accelerating Universe

According to our measurements the Universe accelerates. The diagram below shows the acceleration of the Universe displaying the distances and velocities of supernovae.

Measurements state the degree of acceleration of the Universe. The diagram below shows the acceleration of the Universe displaying the distances and velocities of supernovae.

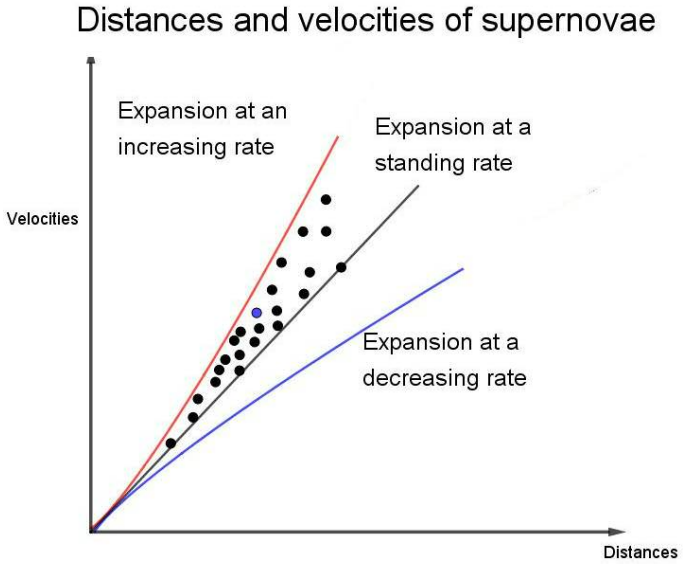

FIG. 26-3 Distances and velocities of supernovae.
Model, not proportional. The original data can be found here[64, 65].
(Credit CC BY–NC–SA 4.0 T. Lajtner, Lajtner.com)

Why does the Universe accelerate? According to physicists it is because there is dark energy that nobody knows about. I assume it is because of gravity.

26.4. Gravity as antigravity caused by mass

Gravity – originally – is a force that holds the masses, planets, galaxies together. Therefore the Solar System is one unit. So far so good. On the other hand, gravitation is janus-faced. It is gravity and antigravity at the same time.

FIG. 26-4 Janus, a god with two faces.
(Ancient Roman religion.)

As it has already been said, gravity increases the wavelength of Space wave. This phenomenon has two effects. Firstly, it shall increase the space between galaxy clusters. According to our measurements the galaxy clusters will be more distant from each other. Secondly, Space waves will always be longer, so galaxy clusters move faster and faster. If we add these two effects, the result is an accelerating universe. So why is the universe expanding? Because there is gravity.

The accelerating Universe can be explained with Space waves. The constant acceleration of gravity has been explained above. The growing acceleration measured in the Universe comes from the growing wavelengths of Space waves between galaxy clusters, since gravity of moving mass makes Space waves longer. Axiom of dark energy as antigravity is over. (No. 14)

In Einstein's model gravity as curvature of spacetime has no velocity—it is a deformity of spacetime. It is a state. We can keep this picture. In this case gravity as Space wave must have such a large velocity that Space waves can be seen as some motionless structure. The velocity of the Space wave (time wave) must be an over-superluminal velocity independent of our viewpoint.

Over-superluminal velocity is the speed limit of superluminal$_M$ matter $v_{over\text{-}sup} >> v_{Superlum\text{-}M}$ and the speed limit of action (force, information) created by matter and embedded in space waves like spooky action detailed in next chapter. $v_{over\text{-}sup} >> v_{Superlum\text{-}EMB}$. That is we can state that Space waves (time waves) are over-superluminal, and therefore they seem motionless, and they exist without pause.

The wavelengths of Space waves can be related to general relativity. A geometric transformation is possible.

In the Theory of General Relativity there is no place for gravity caused by non-fermions, because of the given content of the stress–energy tensor. Light does not cause gravity according to general relativity.

According to Space-Matter Theory a special kind of gravity exists between photons.

26.5. Spooky action as difference of wavelengths of space waves caused by photons

The spooky action at a distance is the nickname of the non-local correlation in quantum entanglement (*nlcqe*) given by Einstein[66]. Quantum entanglement is a physical phenomenon that occurs when two particles interact in a fashion that the quantum state of each particle cannot be described independently. The best known example is the change of spins of photons.

Let us see the whole of spooky action process step by step. i is the number of steps.

Spin of photon is 1, i.e. h/2π. In this description smaller portions of action than h/2π are

supposed. These portions of h exist from the viewpoint of space waves.

---
i=1

$t_{developing\text{-}spin\text{-}1\text{-}step\text{-}i}$: $photon_1$ receives an action from an object that starts creating the spin of $photon_1$. Creation of spin is change. This change creates reaction in space waves: there is longer photons' space wave between $photon_1$ and $photon_2$. $Photon_2$ has no spin; it starts developing its spin when the longer space wave forces it.

$t_{traveling\text{-}force\text{-}i\text{-}photon1}$: a discrete quantity of information (force, action, energy) as modified space wave travels from $photon_1$ to $photon_2$. It is an action for $photon_2$ sent in space waves.

$t_{developing\text{-}spin\text{-}2\text{-}step\text{-}i}$: $photon_2$ starts developing its spin. Developing its spin is the reaction of the action of $photon_1$ sent in space waves.

$t_{traveling\text{-}NO\text{-}force\text{-}i}$: no information (force, action, energy) sent by $photon_2$. There is no space wave modification, because the change of $photon_2$ is slow compared to the velocity of space waves.

$t_{traveling\text{-}force\text{-}i\text{-}photon2}$: a discrete quantity of information (force, action, energy) as modified space wave travels from $photon_2$ to $photon_1$. It is an action for $photon_1$ sent in space waves.

---
i=2

$t_{traveling\text{-}NO\text{-}force\text{-}i}$: no information (force, action, energy) sent by $photon_1$. There is no space wave modification, because the change of $photon_1$ is slow compared to the velocity of space waves.

$t_{developing\text{-}spin\text{-}1\text{-}step\text{-}i}$: $photon_1$ continues to develop its spin as reaction of action sent by $photon_2$. Developing spin means action. Reaction: there is longer photons' space wave between $photon_1$ and $photon_2$.

$t_{traveling\text{-}force\text{-}i\text{-}photon1}$: a discrete quantity of information (force, action, energy) as modified space wave travels from $photon_1$ to $photon_2$. It is an action for $photon_2$ sent in space waves.

$t_{developing\text{-}spin\text{-}2\text{-}step\text{-}i}$: $photon_2$ continues to develop its spin. Developing spin is the reaction of the action of $photon_1$ sent in space waves.

$t_{traveling\text{-}NO\text{-}force\text{-}i}$: no information (force, action, energy) sent by $photon_2$. There is no space wave modification, because the change of $photon_2$ is slow compared to the velocity of space waves.

$t_{traveling\text{-}force\text{-}i\text{-}photon2}$: a discrete quantity of information (force, action, energy) as modified space wave travels from $photon_2$ to $photon_1$. It is an action for $photon_1$ sent in space waves.

---

i=3

$t_{traveling\text{-}NO\text{-}force\text{-}i}$

$t_{developing\text{-}spin\text{-}1\text{-}step\text{-}i}$

$t_{traveling\text{-}force\text{-}i\text{-}photon1}$

$t_{developing\text{-}spin\text{-}2\text{-}step\text{-}i}$

$t_{traveling\text{-}NO\text{-}force\text{-}i}$

$t_{traveling\text{-}force\text{-}i\text{-}photon2}$

…

…

…

---

i=n

$t_{traveling\text{-}NO\text{-}force\text{-}i}$: no information (force, action, energy) sent by $photon_1$. There is no space wave modification, because the change of $photon_1$ is slow compared to the velocity of space waves.

$t_{developing\text{-}spin\text{-}1\text{-}step\text{-}i}$: $photon_1$ has developed its spin.

$t_{traveling\text{-}force\text{-}i\text{-}photon1}$: a discrete quantity of information (force, action, energy) as modified space wave travels from $photon_1$ to $photon_2$. It is an action for $photon_2$ sent in space waves.

$t_{traveling\text{-}NO\text{-}force\text{-}i}$: no information (force, action, energy) sent by $photon_2$. There is no space wave modification, because the change of $photon_2$ is slow compared to the velocity of space waves.

$t_{developing\text{-}spin\text{-}2\text{-}step\text{-}i}$: $photon_2$ has developed its spin.

$t_{traveling\text{-}force\text{-}i\text{-}photon2}$: a discrete quantity of information (force, action, energy) as modified space wave travels from $photon_2$ to $photon_1$. It is an action for $photon_1$ sent in space waves.

$t_{appearing\text{-}spin\text{-}1}$: $photon_1$ gives reaction to the object that started the whole process.

Summarized these steps in one function:

$$t_{nlcqe}= t_{traveling\text{-}NO\text{-}force\text{-}i} +t_{developing\text{-}spin\text{-}1\text{-}step\text{-}i}+ t_{traveling\text{-}force\text{-}i\text{-}photon1}+ +t_{developing\text{-}spin\text{-}2\text{-}step\text{-}i}+ t_{traveling\text{-}NO\text{-}force\text{-}i} +t_{traveling\text{-}force\text{-}i\text{-}photon2}, \quad (26\text{-}2)$$

where i=1, 2, …, n. t_{nlcqe} has superluminal$_{EMB}$ velocity. Attention! There is a special communication in Eq. 26–3.
The question is $t_{traveling\text{-}force\text{-}i\text{-}photon1.}$ The answer is $t_{traveling\text{-}force\text{-}i\text{-}photon2,}$

Theoretically $t_{traveling\text{-}force\text{-}i\text{-}photon1}+t_{traveling\text{-}force\text{-}i\text{-}photon2}+t_{traveling\text{-}NO\text{-}force\text{-}i}=0$, because spin$_1$ and spin$_2$ are developed at the same time. In reality
$t_{traveling\text{-}force\text{-}i\text{-}photon1}+t_{traveling\text{-}force\text{-}i\text{-}photon2}+ t_{traveling\text{-}NO\text{-}force\text{-}i} >0$
but from the viewpoint of matter
$t_{traveling\text{-}force\text{-}i\text{-}photon1}+t_{traveling\text{-}force\text{-}i\text{-}photon2}+ t_{traveling\text{-}NO\text{-}force\text{-}i} \approx 0.$
This works only if space wave has over-superluminal velocity
$v_{over\text{-}superlum}$ as mentioned earlier. The false axiom of no superluminal communication is out of order. (No. 15)

Since we cannot measure the time of travelling message
$t_{traveling\text{-}force\text{-}i}=t_{traveling\text{-}message\text{-}i}$, we measure time until the spin of photon$_2$ is detectable. In Eq. (26–4) and Eq. (26–5) we measure t_{nlcqe}.

$$t_{nlcqe–Salart} \approx 1.8\cdot10^4 \text{ (m)}/5.4\cdot10^4\cdot c \text{ (m/sec)}=1.11\cdot10^{-9} \text{ sec}, \quad (26\text{-}3)$$

where the distance is $1.8\cdot10^4$ m in Salart's experiment, supposing that the spooky action did not use the fiber optic network where photons travelled, they used space waves. The length of the fiber optic network was much longer than 18 km (11.2 mi), it was 35.0 km. Calculating with 35.0 km, the calculated value does not change significantly, every conclusion remains the same. (18 km is the bee line. The calculation in Eq. (26–4) is based on a theoretical consideration: if the fiber optic network is cut, the photons will be unable to change spins. I do not think this situation may happen with photons.)

$$t_{nlcqe–Yin} \approx 1.53\cdot10^4 \text{ (m)}/1.38\cdot10^4\cdot c \text{ (m/sec)}=3.69\cdot10^{-9} \text{ sec}, \quad (26\text{-}4)$$

where time is calculated from the data based on the distance and the velocity of spooky actions of Yin's experiment.

Remember the measured velocities of the spooky action are 54,000c by Salart and 13.800c by Yin. Note there was a *longer distance* between the two photons in Salart's experiment, still the measured *time* of spooky action was *shorter* here. Compare Eq. (26-4) and Eq. (26–5).

The velocity of the space wave of photon's space must be over 13,800c (Yin) or even 54,000c (Salart), since photons need time to change their structure: $t_{developing.spin}>0$.

Another consequence of this statement is that photons have structures. This statement is not surprisingly new, it has come up several times before.

26.6. Gravity caused by particles made of space waves

Schrödinger's cat is an example of physical aspects. The paradox by Erwin Schrödinger (1887-1961) states that a fictional cat in a fictional experiment may be simultaneously dead *and* alive. We do not know if the cat lives or does not live until we have seen (measure) its state[67].

FIG. 26-5 To be, *and* not to be: that is no question.
(Credit CC0 Anniken and Andreas, Noun Project, nounproject.com)

In terms of physics the cat has two quantum superpositions "A" and "B" at the same time—dead and alive. Only one of these superpositions remains, depending on a quantum event that chooses one state. The other one disappears. According to physics this superposition exists in the case of photons and other elementary and not elementary particles.

This is more than pure theory, there are experiments that prove the existence of the paradox, see e.g. Wineland's papers[68]. What is more, physicists can create A_i and B_i superpositions in i consecutive experiments where $A_i \neq A_{i+1}$ and $B_i \neq B_{i+1}$ and i=1, 2, 3, … see Hacker's "Light Schrödinger-cat state" experiment[69]. This experiment will be the example we are going to study.

"Light cat experiment" is an experimental verification of the old Schrödinger-cat paradox. Three phenomena take part in "Light cat experiment". A rubidium atom, and a light unit (photon) in two superpositions. They all are in a cavity. The atom can occupy two different energy levels. Depending on its energy level, the light is reflected either on the outer wall of the cavity, or it penetrates into the cavity, is thrown back and forth in it and finally reflected back out, which, however, is accompanied by a phase shift. As long as the energy level of the atom remains in a superposition, i.e. it can be greater or smaller, the light wave is in two states: in both phase-shifted and non-phase-shifted state. This is like the dead and alive cat.

It seems a single matter particle, in this case a photon can have two different superpositions at the same time.

How can this "light cat" work? Modern physics can produce many quantum superpositions of different "cats", but we do not have an answer as for how something can be in two different states or at two different positions at the same time? This is a real mystery.

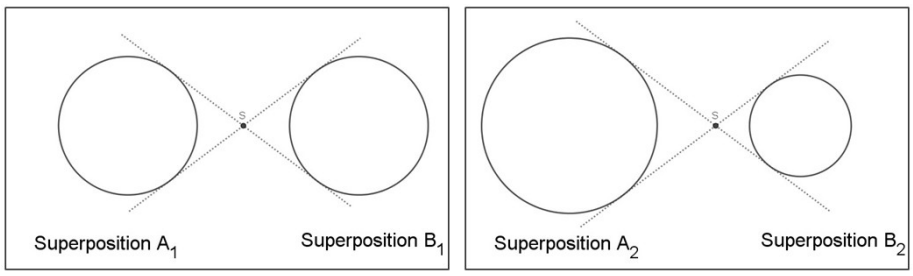

FIG. 26-6 Superposition pairs of photon$_1$ and photon$_2$.
We imagine two photons$_1$ in different positions, namely Photon A_1 and Photon B_1. In Space-Matter theory the particle is one non-matter particle e.g. one non-matter photon. The figure displays the geometrical interpretation of non-matter Schrödinger-cat A *and* B.

Model, not proportional.

Physics supposes that both photons are made of matter. In Space-Matter theory Superposition A and B are real, but they are not made of matter. $Photon_A$ and $Photon_B$ are non-matter phenomena, they are space waves travelling at velocity c. Therefore Superposition B can be given by scaling from Superposition A. In Hacker's experiment the scaling point is the atom.
Superposition A and Superposition B are not independent, what is more they co-operate.

$$E_{Superposition.A}+E_{Superposition.B}=1 \qquad (26\text{-}5)$$

In Eq. (26–6) the whole energy is expressed as a constant wave-length of over-superluminal space wave created by space-photons.

Over-superluminal space waves can solve the "cat" problems, which are as follow:

- How can be one single phenomenon at two different places at the same time?
- Where does the energy (action, force) of the disappearing superposition vanish?

The two superpositions as matter particles do not exist. They exist as space phenomena, they are different wavelengths in space waves. To make the explanation easier they will be called space-photons. Of course these space phenomena can be other particles, not only photons.

Space-photons turn into matter when one of the space-photons has some action with its environment. The other one disappears. How can we imagine the working method of these space-photons? The following figures show a possible model.

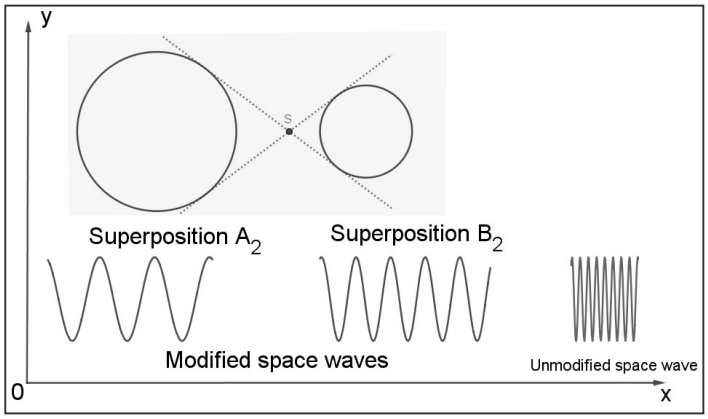

FIG. 26-7 Superpositions as space waves.
x and y are spatial coordinates. Model, not proportional.

Superposition means space-photons are space waves. These space-photons are not real photons, because they do not exist as matter. (They are space-matter.) On the other hand, space-photons travel at velocity c like matter photons do, and space-photons also travel on Space waves generated by mass. In the light cat experiment the rubidium atom is the mass.

But there is a big difference between matter-photon and space-photon. A matter-photon has only two parts: it is the one itself and a space copy in the over-superluminal space wave.

The space-photon has three parts: Space-photon A, Space-photon B as Superposition A and B, and their space copies in the over-superluminal space waves generated by space-photons. The

space-photon as wave and its "copy in space waves" are different, because their velocities are different. In this case the space-photon has some matter character, since its velocity is smaller than the velocity of over-superluminal space wave: $v_{over-superlum} > c_{space-photon}$.

When Superposition A turns into matter Superposition B does not disappear without a trace. It also turns into matter. The whole energy of both space-photons creates a matter-photon. This cooperation works using over-superluminal space waves that connects these two space-photons. Axiom of an object is always made of matter is out of order. (No. 16) And therefore all definitions of gravity that apply gravity only to objects with mass are obsolete.

Let us see now how Schrödinger-cat works.

Superposition A and Superposition B are in pair. We know Space waves generated by the atom are over-superluminal, and space-photons as wave have c velocity. We also know space wave created by space-photons are also over-superluminal.

The rubidium atom occupies energy level A out of its A and B possible energy levels. The wavelength of Space wave changes. Superposition A follows the changing wavelength of Space wave on which it travels. The rubidium atom has the energy level B no more, the Space wave that Space-photon B uses as space disappears, therefore Space-photon B ceases to exist. Its energy is transported by over-superluminal space waves created by space-photons to Space-photon A that turns into matter-photon using this additional energy. Over-superluminal velocity is correct, because there is no action embedded in this space wave.

Only both space-photons A and B (Superpositions A and B) have enough energy that can create a matter-photon that remains matter. No energy lost.

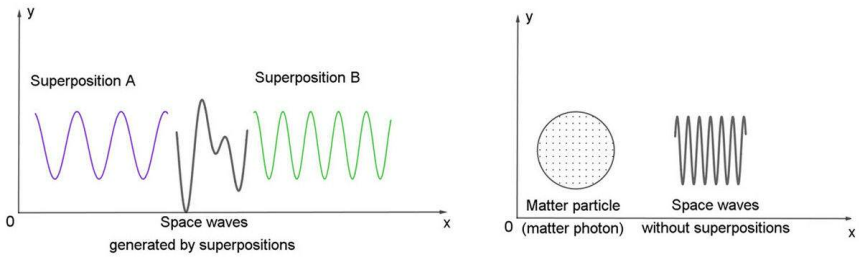

FIG. 26-8 How does Schrödinger-cat work?
x and y are spatial coordinates. Model, not proportional.
The first picture shows the space wave generated by Superpositions A and B. In the second picture Superposition B disappears. Its part of space wave also disappears, space wave created by space-photons will have shorter wavelength and greater frequency. This greater frequency means greater force on Space-photon A. It turns into matter-photon. This mechanism needs an important factor, a superluminal connection between space-photons. Schrödinger-cat does not work without over-superluminal space waves.
The matter-photon has its own space copy which is not shown here.

We may imagine the process this way: as long as gravity exists between space-photons no space-photon is able to turn into matter photon. If gravity ceases one of superpositions turns into matter using the energy of each superposition.

To put it simpler: if Superposition B does not exist, there is no more gravity force between the

two space-photons. No force anchors Space-photon A in space. Even more, the disappearing gravity is a force that turns Space-photon A into matter state. Axiom of matter is able to be at two different places at the same time is over. (No. 17)

According to Space-Matter model matter particles can have attributes that are in superposition, but matter particles can have only one position. Is this statement consistent with the Double-slit experiment? Yes, it is. The Double-slit experiment is basically the demonstration of wave-particle duality. In the experiment one single object (particle, atom, molecule) is able to picture an interference pattern appearing on the screen. Interference without partner, interference with itself. It is assumed to be able to affect the very object. In this case the particle must be at two different places at the same time.

This seems to be the same effect as the one called Schrödinger-cat. But in fact it is not. In the double split experiment space waves have interferences. The particle travels on interfering space waves. The particle only displays this interference, but it does not cause it. Likewise, the double-split experiment does not work without space waves either.

The above-mentioned are important if we want to understand what LIGO measures as gravitational wave.

26.7. Gravitational waves measured by LIGO

In spacetime model of physics, no particles (either real or hypothetical) can move faster than light (cf. Standard Model of Physics[70]). Not even the wave of gravity that travels in fabric of space. It has c velocity.

$$v_{gravity}=c \qquad (26\text{-}6)$$

Eq. (26–7) was Einstein's theoretical concept. First Hulse and Tayor[71, 72] proposed measuring the gravitational wave to find Eq. (26–7). They were awarded the Nobel Price for this measuring[73], but the question remained open. Chinese scientists are supposed to have measure the same value[74]. On the other hand, there are physicists that state gravity is much faster than light[75]. According to measurements of Flandern (1940 - 2009) the speed of gravity is at least $v_{gravity}=2\cdot10^{10}c=6\cdot10^{18}$ m/s.

The physicists of LIGO accept Eq. (26–7) as fact. Based upon it, LIGO's scientists are supposed to have measured the gravitational waves of two black holes that collided. The event measured took place 1.3 billion years ago. In the collision about 3 times the mass of the Sun was converted into gravitational waves in a fraction of a second[76]. This gravitational wave was measured by LIGO. This was the first measurement of LIGO in September 2015. The timing of the collision of two black holes proved extremely lucky. The gravitational waves arrived the Earth 1.3 billion years + 100 years + 9 months after their collision. It was exactly the time when Einstein's paper of general relativity turned 100, and the 1 billion dollar LIGO had its test run.

26.8. Black holes or gamma rays?

LIGO measures using light. In my opinion, it was not the gravitational effect of two black holes merged that LIGO measured in its first measurement, but gravity's effect upon the electromagnetic energy (light) which has now reached us[77,]. The Fermi space telescope detected a burst of gamma rays 0.4 seconds later after the measurement of LIGO. Black holes are not expected to radiate light. Or are they?[78] From the perspective of the Space-Matter model, what LIGO's measurement

precisely demonstrates is that everything, even light, alters space and also time waves. (There is gravity between lights.) This is exactly what the Space-Matter model propounds.

LIGO's scientists and other academic physicists certainly refuse this kind of "gamma ray interpretation"[79], because they think within a different conceptual framework. Their interpretation of the causes of the measurement is based on Einstein's theory.

Nowadays LIGO has several measurement experiences, and according to these measurements the gravitational wave created by mass exists.

26.9. Velocity of gravitational waves and Space waves

The published measurements of LIGO and the academic standpoint seem to contradict the Space-Matter theory where the speed of gravity is over-superluminal, $v_{Space\text{-}wave}=v_{gravity}>>c$. Is there truly a contradiction? No, there is not. Everything that travels in Space at velocity v is different from Space, if $v<v_{Space\text{-}wave}$.

Saying this there are two different phenomena here. Gravitational waves measured by LIGO are transverse waves. A transverse wave is a moving wave of non-space. Light is transverse wave. It consists of oscillations occurring perpendicular to the direction of the propagation of the wave.

This transverse wave travels on the space waves created by mass. To make is more understandable, let us suppose a model where space waves created by mass are longitudinal waves. This presumption is not necessary, but it helps to imagine the difference. Longitudinal waves, like sound, are waves in which the displacement of the medium is in the same (or opposite) direction as the direction of wave's propagation. See the difference in FIG. 26–8. The arrows show the direction of the propagation of waves.

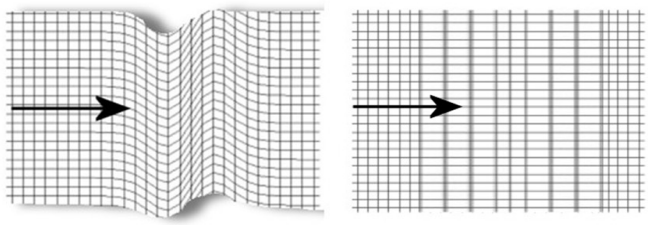

FIG. 26-9 Transverse and longitudinal waves.
Simple model.

In order to understand the working method of Space waves Space waves (time waves) that create gravity force they can be supposed to be standing waves. This idea is partly real, since Space waves are much faster than matter, therefore changes of matter act on the Space wave with pause from the viewpoint of Space wave.

Transverse gravitational waves travel on standing Space waves like light does. This model seems to be an acceptable model, since light (energy) can be embedded in space waves described in the Schrödinger-cat part. This embedded light in space waves has c velocity. $v_{gravitational.wave}=c$. Knowing how Schrödinger-cat works, we may conclude: gravitational wave measured by LIGO is the wave of space-photons. This kind of gravitational wave is an energy wave embedded in space waves that travels on Space waves caused by masses.

26.10. A major consequence of LIGO's measurements

Existing gravitational waves created by different attributes of matter explained by general relativity confirm my earlier statement. Not only mass has a copy in Space. Every attribute of matter has a copy in space. This result is measured. It is fact.

Now let us see some further surprising phenomena of space waves.

27. MATTER MADE OF SPACE

27.1. Rotating galaxies

Gravity grows the waves of Space, that is Space. The growing wavelengths of Space waves means if after the extension reaches a certain size, the density of space decreases to such an extent that Space transforms into matter. This is like Space would hole. Since where there is no space, there is matter, and where there is no matter, there is space, it will be matter in the hole.

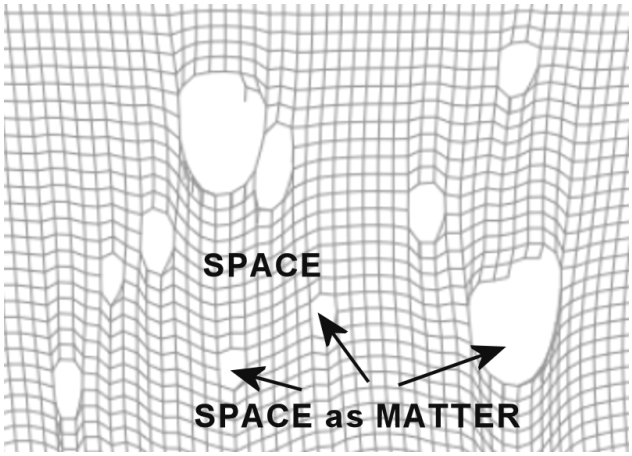

FIG. 27-1 Space as matter.
(Credit Picture CC BY–NC–SA 4.0 T. Lajtner, Lajtner.com from CC0 mtorn, Codepen.io)

In galaxies, the objects do not rotate as they do in the solar system. In the solar system the 3rd Kepler law of Johannes Kepler (1571-1630) is valid. The orbital periods of the planets depend on how far they are from the sun. The farther, the slower.

The stars in galaxies rotate differently from the planets in our solar system[80] – discovered by Vera C. Rubin (1928 - 2016).

How do stars rotate in a galaxy? According to Newton's Law of Gravity we would expect the lower blue line. The stars have chosen the black line.

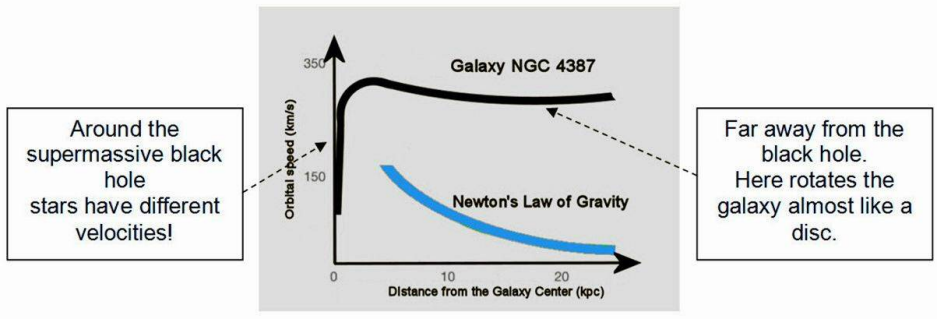

FIG. 27-2 Velocities of stars in galaxy NGC 4387.
The diagram is not perfectly proportional.
(Credit CC BY–NC–SA 4.0 T. Lajtner, Lajtner.com)

Why-do not the outer stars of the galaxy fly away? According to physics the dark matter should work here. Dark matter is supposed to exist. There are some evidences that can proves its existence, but its existence is not obvious. For example, according to Müller[81]. dark matter is missing in the galaxy "Centaurus A". The existence of dark matter as matter is questionable. The role of "dark matter" is not.

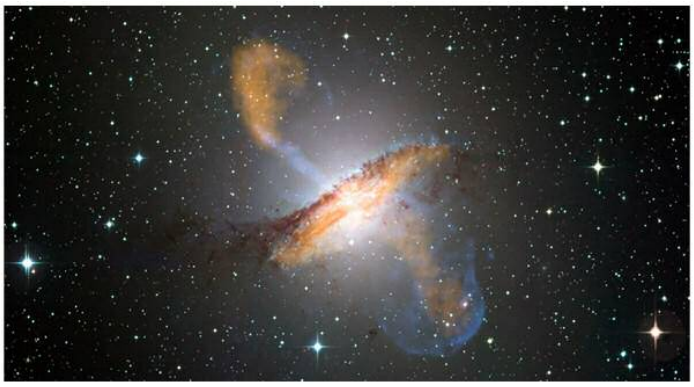

FIG. 27-3 Centaurus A. without(?) dark matter
(Credit: CC BY 4.0 ESO/WFI (visible). Weiss et al. (microwave); NASA/CXC/CfA/R. Kraft et al. (X-ray), Edited)

And there is the Tulley-Fisher relation (TFR)[82]. This an empirical relation between intrinsic luminosity of a spiral galaxy and its rotation velocity. The bigger is the luminosity created by more stars, that is from more mass, the faster the rotation of the galaxy is. It seems to be logical, but it is not, since according to measurements, the mass of stars is not enough to keep faster rotation alive.

What else is able to effect here? The Space whose density is so low that Space is transformed into matter. $D_{Space}<D_{min}$. The more stars are the smaller the density of Space is. It means Space will have increased nature of matter.

What is matter, and what is space? As you have read it above, it depends on their density and actions. Quantum mechanics has known for ages that matter can be created out of Space. The particle created from Space will disappear after some time. The process is regulated by the Planck constant h. This is a phenomenon we know: matter can be created out of the Space. So my claim that space can be turned into matter has a stable base.

27.2. What is a black hole made of?

Black holes were long considered a mathematical curiosity, a singularity according to the theory of general relativity. General relativity states that a sufficiently compact mass can deform spacetime to form a black hole.[83] [84] How? Compact mass collapses to zero radius. Its surface gravity becomes infinite just as its density. A black hole is not just a big mass with big gravity, but it is a region of spacetime exhibiting such strong gravitational effects that particles with or without mass cannot escape from the inside of it [85]. The singularity in physics is disputable, since the infinite gravity does not come into being. The value of the external gravitational field of a black hole outside of its horizon is the same as that of any other object of the same mass.[86]

Nowadays black holes in physics are considered real objects. Supermassive black holes exist in the centers of most, or presumably all galaxies and in other phenomena. Time, space and matter we know cease to exist in black holes, although the mass of a black hole is a positive value, and black hole can also have several other physical characteristics. Black holes are able to grow by absorbing mass from their surroundings. By absorbing other stars and merging with other black holes,

supermassive black holes may form black holes whose masses are millions of solar masses. Following the logic of general relativity, black holes are considered to be born when massive stars with more than 25 solar masses collapse to zero radius. Observations and calculations show there is a supermassive black hole in our Milky Way that has 4 million solar masses[87, 88] . Its diameter is short[89], it is about 46 million km. The distance of Earth from the Sun is three times longer. In principle, black holes could be formed in high-energy collisions that achieve sufficient density. There are black holes in the Universe with over one billion sun masses[90]. We do not know how these super large black holes have been created; there are several different theories.

In general, when very massive stars collapse, physicists nowadays suggest a black hole has come about. Are there any other ideas as for how black holes are created? Certainly. We do not need the collapse of a very massive star. We need a great number of big masses inside a galaxy. Masses increase the wavelengths of Space wave. If these is a substantial mass in the given region of Space, Space waves will be very long., Long waves result in $D_{Space}<D_{min}$, Space will be matter, and because of the small density of Space waves, a black hole will be created. Where does the black hole come into being? It depends on the topography of Space waves of masses—typically in the centers of galaxies. Nowadays every galaxy seems to have a central supermassive black hole and several smaller black holes in the galaxies.

In a black hole mass is supposed to disappear. How? Masses in a black hole act like mass in the tunneling. If Space changes into matter-space, matter changes its form. That is, mass transforms into fast wave that travels in matter-space. In turn black holes do not lead to the creation of new Universes. Matter remains in our Universe, but in a different form.

27.3. Why cannot black holes and galaxies grow infinite?

After a black hole has been created, it can continue to grow by absorbing mass from its surroundings. The process is not as simple as written here, black holes have event horizon and accretion disks that play important role in the mechanism of a black hole. I will not go into details of these.

How big can a black hole be? A black hole is the lack of Space. If a black hole in the middle of a galaxy started absorbing masses from its surroundings, it would become smaller.

Why? Because masses "sucked in" from the black hole's surroundings are parts of the system that keeps the tearing "alive". "Sucking in" means that masses will be stuck in the black hole. In the galaxies, masses are moving. We know moving bodies change their masses and gravities by their velocity. So, the gravity of the system cannot be the same without the existence of the given "sucked" masses, since the "sucking in" process is just one picture of the movie. It is just one state of the gravity of a given mass that was present at a given velocity. The masses that disappear in the black hole do not change their gravity any more. The mass around the black hole not "sucked in" can replace the lost gravity only at a certain rate. The more mass disappears in the black hole, the sooner the decreasing of the black hole sets in, since the mass around it cannot travels faster than light in Space. There is a point where the gravity of the system will decrease, in turn the black hole will be smaller, and its gravity will be smaller.

If the black hole decreases, the bodies around the black hole will also travel slower. The system will find its equilibrium via iterations. There has been equilibrium since we have the privilege to live in a stable galaxy.

The same effect regulates the sizes of galaxies. In bigger galaxies the supermassive black holes have bigger mass.

Where is the mass "sucked in"? As mass quality this mass disappears, and it becomes fast waves. The metamorphosis of how mass turns into fast wave and fast wave into mass is fast and

observable in tunneling. Fast waves are able to leave and enter the black hole without getting stuck since they are not connected by gravity. They may use some different kind of gravity modified space waves in the given space.

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Black holes and galaxies cannot grow infinite. And what about the Universe?

28. HUGE, BUT NOT INFINITE

28.1. Hubble spheres

Based on Hubble constant (H_0) by Edwin Hubble (1889 - 1953) and other calculations our Universe is about $1.38 \cdot 10^{10}$ years (13.8 billion years) old[91]. It is a simple statement about our Universe, but one Universe is not enough for intelligent human beings. They are speaking about multiversum. In multiversum there are several universes. From this point on the definition of multiversum is widely varies. Without going into further details, I will only deal with Hubble length and Hubble sphere. Hubble length is the a distance in cosmology, see Eq. (28–1).

$$l_H = c/H_0 = 1.44 \cdot 10^{10} \text{ light years} = 1.36 \cdot 10^{23} \text{km}, \qquad (28\text{-}1)$$

where Hubble constant (or Hubble parameter) is about 67.77 km/s/Mpc according to the latest measure[92] known (2018). Hubble parameter depends on the expansion of the Universe, i.e. Hubble length also changes. To our knowledge today it increases.

Hubble sphere is a spherical region of the observable Universe surrounding an observer. The radius of this sphere is Hubble length. In academic physics Hubble sphere is a very unique kind of space. Inside of it objects recede slower than the speed of light. And what is outside the Hubble sphere? There recede objects faster than light[93]. What is the cause of these superluminal velocities? This superluminal velocity is neither superluminal_M nor $\text{superluminal}_{EMB}$. This is the $\text{superlunial}_{Quasi}$ velocity created by two effects: by the own velocity of the object and by the accelerating Universe. The object moves together with the acceleration of the Universe and the two velocities add up. From our viewpoint the objects travel at $\text{superlunial}_{Quasi}$ velocity. As mentioned earlier the acceleration of the Universe is created by gravity, so the $\text{superlunial}_{Quasi}$ velocity of an object with mass constantly increases itself. Here photon and mass remain unchanged, and do not transform into fast waves or are embedded space waves.[i]

The observable Universe is bigger than Hubble sphere, its radius is longer, since we can see galaxies that are used to be inside of our sphere, so their light reached us.

There are many theories based on the visible and invisible region of the Universe. The invisible region is the region that we cannot see, because it is too far from us.

One of these theories says there are several Hubble spheres next to our Hubble sphere[94] in Our Universe. (OU). OU is homogeneously (=smooth) and isotropic (the Universe looks the same in every direction). The Universe has also been infinite since the moment of its creation. This is the main axiom of this academic theory. According to the Big Bang theory OU was smaller than a point in its first state. This small point also was infinite. This is the viewpoint of mathematics and today's physics.

Countless objects can be in infinite OU. Supposing an infinite number of Hubble spheres, and supposing we know every particle, we can determine the number how many different Hubble spheres can be built. Each Hubble sphere is a different universe. If every possible Hubble sphere is created and they work, and a $\text{Hubble spheres}_{New}$ comes into being, this $\text{Hubble spheres}_{New}$ (Universe_{New}) must be a copy of an existing Hubble sphere. Since a Hubble sphere is smaller than OU, it means, there are parts in OU that are the same. So you and everybody and everything must have a copy or even more copies somewhere in the World.

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[i] We have found five superluminal velocities as yet. These are: $\text{Superluminal}_{Group}$, Superluminal_M, $\text{Superluminal}_{EMB}$, $\text{Superluminal}_{Quasi}$, Over-Superluminal.

This logic is based on two things:

1. on the speed of light that is finite
2. and on the method of the infinite numbers

Is this model acceptable? The answer depends on Our Universe. If Our Universe is not infinite, then this theory is not acceptable. How to decide whether Our Universe is infinite?

28.2. How big is Our Universe?

From now on we suppose that the laws of physics are the same in our whole Universe. This is our earlier assumption written in Chapter "Spacetime continuum by Einstein". Now it has a more general form.

Let us see the Universe this way: in a Universe it must be true that the laws of physics including that two photons are able to develop their spins synchronized. In plain English the spooky action remains true, no matter where the photons are, whether in the same Hubble sphere or in different ones.

Knowing that time wave is space wave, we can give a new definition of the size of the universe.

All in all, the diameter of a spherical Universe $l_{Universe}$ cannot be longer than $s_{TW\text{-}ALG}$, where $s_{TW\text{-}ALG}$ is the spatial distance that time wave travels in a time period. This is the time period while photons change their spins: $t_{traveling\text{-}NO\text{-}force\text{-}i}+t_{developing\text{-}spin\text{-}1\text{-}step\text{-}i}+t_{traveling\text{-}force\text{-}i\text{-}photon1}$

$$l_{Universe} \leq S_{TW\text{-}ALG}, \qquad (28\text{-}2)$$

If Eq. (28–2) is not true, the various parts of the Universe have different rules, that is there are two (more) different universes. The size of a universe cannot not be arbitrarily large or infinite. Its size depends on the speed of its time. This size is much bigger than a Hubble sphere. How big may it be?

Knowing that the wave of time is the wave of space, the accelerating universe does not change the velocity of time.

The answer is based on two phenomena: on time wave *and* on working algorithm of photons (and/or other particles). Remember the experiments by Salart et al. and Yin at al. They measured the speed of the spooky action. Applying the data of the given studies, photons need time to develop their spins.

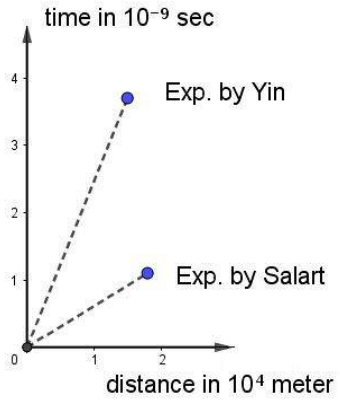

FIG. 28-1 Salart's and Yin's experiment of spooky action.

As we said earlier in Salart's experiment there was a *longer* distance between the two photons, still the measured time of spooky action was *shorter* here.

The magnitudes of order are the same.

As mentioned above, t_{nlcqe} has several parts, and they were not separated in the experiments. The steps of developing spins I have given above. Now let us see these several time periods differently:

- time period #1 that action as space wave needs to travel from $photon_1$ to $photon_2$,
- time period #2 that $photon_1$ needs to start and finish developing its spin.

The time wave (space wave) of photon is very fast. Its part in t_{nlcqe} is negligible.

Now let us suppose a new model. Both photons are in the Universe. $Photon_1$ is as far away from $photon_2$ as possible. We may think that $photon_1$ and $photon_2$ work the same way, that is both need the same time to create their spins.

$t_{developing\text{-}spin1}=t_{developing\text{-}spin2}$. In this case the time wave (space wave) of photon has time $t_{traveling\text{-}message}<t_{developing\text{-}spin1}$ to reach $photon_2$. How long can a distance between the two photons be? It depends on the velocity of space wave (time wave).

28.3. New definition of the Universe

Based on my simple calculation of the velocity of Space wave caused by mass, time of photon must be able to synchronize the development of spins of photons in a very big universe. This ability of time wave works in a universe that is many billion times bigger than $9.3 \cdot 10^{10}$ light years, which is the estimated length of the diameter of our observable Universe[95]. For more details about the characteristics of time wave see Appendix.

Our Universe is huge, and it can be even more monumental, but it cannot be infinite in space. Axiom of an infinite universe is out of order. (No. 18)

A universe is one entity if its time waves are able to travel "i times" the diameter of the universe in a time period that is no longer than the time period that a photon needs to develop its spin.

i is the number of steps mentioned above that photons need to develop their spins. The word "diameter" does not necessarily mean that our Universe is spherical. "Diameter" is the possible longest "straight" spatial distance in Our Universe that can exist within two objects that have smaller velocities than $velocity_{over\text{-}sup}$. On the other hand, this is the shortest spatial distance between these given objects.

This rule can be applied to every space, even to matter-space. The spatial size of a given space and the velocity of time wave in this space are connected with the above-mentioned law. Saying this, Our Universe has the fastest time wave.

Time wave is the creator and implementer of general causality.

In every space(j) in Our Universe where the longest distance is shorter than the diameter of Our Universe time wave has lower velocity than the velocity of Space wave (time wave) of Our Universe.

$$\text{If longest distance}_{space(j)}<\text{diameter}_{Our\text{-}Univ},$$
$$\text{then } v_{space\text{-}wave\text{-}in\text{-}space(j)}<v_{Space\text{-}wave}. \qquad (28\text{-}3)$$

Consequently if there is a space(j) where the longest distance is the same or shorter than the diameter of Our Universe, the velocity of matter is lower here than the velocity of Space waves.

$$\text{If longest distance}_{\text{space(j)}} \leq \text{diameter}_{\text{Our-Univ}},$$
$$\text{then } v_{\text{matter.in.space(j)}} < v_{\text{Space-wave}}. \qquad (28\text{-}4)$$

These functions are valid in every system. If they are not valid in in a given system, this system cannot be described by our current knowledge. For instance, if there is a "strange" universe that has longer diameter than the diameter of Our Universe can ever be and it has time wave, this universe contains matter and/or space that are unknown in Our Universe. (Note the diameter of Our Universe is growing from our viewpoint but not from the viewpoint of the velocity of Space waves.)

28.4. Flat and finite

There are long discussions about the geometry of the Universe. According to the Friedmann[96] equations (1922) based on general relativity supposing a homogeneous and isotropic space (Universe) there are three possibilities shown by FIG. 28–2. In plain English, the curvature of the Universe depends on the Hubble constant and the gravitational constant. Expertly: the Universe is flat if the mean energy density of the Universe (p_m) observed and calculated from the observations is equal to the critical (theoretical) density p_c.

$$p_c = 3H_0^2/8\pi G = p_m. \qquad (28\text{-}4)$$

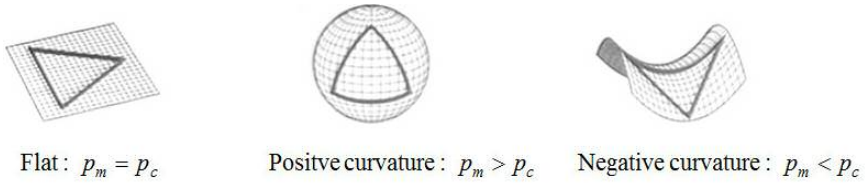

FIG. 28-2 What is the geometry of our Universe?
The two-dimensional triangles symbolize the three possible different geometries
of the three-dimensional Universe. Model.

According to the mass density of $9.9 \cdot 10^{-30}$ g/cm^3 measured by the Planck[97], WMAP[98] and other space telescopes, Eq. (28–4) is true, that is our Universe is flat. So its geometry can be described by the Euclidean geometry (where the spatial curvature parameter is zero). This solution does not imply that the Universe is infinite. But it does mean that the Universe is much larger than the visible Universe.

The global geometry of the whole Universe is flat. Special relativity completed with the part about the superluminal$_M$ velocity seems to be a more general model than we thought earlier. That is why I displayed the sketch of the "relativity superluminal" above.

28.5. Big Bang

According to the above-mentioned, Our Universe may have a finite spatial area. The world models with finite spatial distances predict a finite time. Is this prediction right?

What does academic physics say? It cannot predict the future of Universe. The timeline of Universe supposes a start, but the measurable acceleration of Universe does not indicate that the

Universe will have an end. Physics cannot say anything about how long Universe will exist, not even the well-known Big Bang theory can give any estimate.

According to Big Bang theory, Universe was created from a singularity. Singularity means a location in the spacetime where the density of matter is infinite. This state is beyond the boundaries of physics. The creation of Universe from singularity is known as “Big Bang”.

FIG. 28–3 highlights the concept of the Big Bang. According to this, our Universe was created practically from naught. There was neither space, nor time, nor spacetime in this early state of Universe. This ”naught” or ”anything” as singularity was a point in the quantum indigenous status (?). This point contained every matter compressed in a form we don’t know. The Big Bang as an event is also referred to as the birth of our universe.

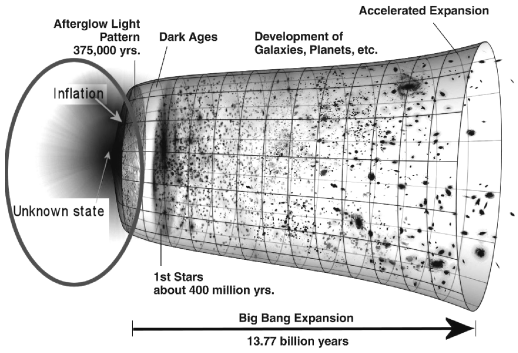

FIG. 28-3 Big Bang theory: Universe from the beginning to the present.
The evolution of stars, galaxies etc. can be explained by this theory particles. Its main phases are the following ones: the singularity (unknown state), the Planck epoch where there only quark-gluon plasma was. It follows the inflation epoch and many other epochs where elementary particles and our known matter were created. Big Bang uses a special future light cone.
(Credit Public Domain © NASA, Edited)

There are five weak points of this model. These are the *unknown state before the Planck epoch,* the *cosmic inflation,* and we cannot predict the *future of the Universe*.

The forth weak point is the *light cone*. As mentioned earlier the light cone is just one cone out of more cones.

The fifth weak point is the most exciting one. The Big Bang model is based on calculations with the matter we do know of. To date, science supposed that only protons and neutrons can build stable nucleus. This is a misbelief according to latest experiments. There is a relatively stable nuclear bound system without neutron—with strangeness[99]. Or let us see the three-photons bound experiment[100]. We did not think that a bound system can be built out of photons. We were wrong. Researchers created a bound system made of three photons. What is more, the bound photons acquired mass. (If photons have mass they cannot travel at velocity c. They traveled about 3 km/s instead of 300,000 km/sec. I think they traveled in Space of mass.)

After Big Bang’s Planck epoch the inflation was an early phase of Universe. Via the inflation Universe grew exponentially in a tiny fraction of a second —much faster than the speed of light. Why does the inflation exist in this model? Because this concept has a hidden axiom: at the beginning of Universe everything was in one single point. This is a belief that comes from general relativity and from the diagram of Hubble constant. Behind them there is one single reason: our old vision of time. Universe needs time to exist. This statement is true if we understand the word ”time”

as the action-reaction phenomenon of space and matter. In this case there can be objects that have time, but different from the ones fast waves do. As you have experienced, we cannot picture fast waves using our space and our time. We picture the results measured and the path supposed in our space and time (spacetime) instead, which is a notion based on our calculation.

28.6. Ouroboros-like Universe

Using new definitions of time and space given earlier**,** and supposing space waves and knowing that Universe accelerates, we can replace the unknown state and the cosmic inflation of Universe with the following ideas.

If mass accelerates permanently, the wavelengths of space waves permanently grow. The growing of the wavelengths of space waves turn space into matter-space. Mass (matter) will be transformed into fast wave. If every or almost every mass (matter) is transformed into fast waves, then the space wavelengths decrease, since there is no matter or almost no matter in space. The decreasing space waves make it possible for fast waves to turn back into particle or wave. If we were able to observe this process, we could see that the contraction of space has over-superluminal velocity. Fast waves need time to turn into waves and/or particles. This is a process. As long as this process continues, both matter-spaces and Space exist. These matter-spaces are surrounded by space waves of very high frequency. Space waves compress matter-spaces into one region. Since Space exists, the metamorphosis of fast wave into wave/particle is possible, Space waves come into existence, and matter appears as wave or particle.

Fast waves need time to transform themselves into waves or particles, e.g. to have a new spin developed. The time period of transforming and the time period of the contraction of space are in harmony in *one* Universe, according to the above-written definition.

In this model the energy of the „Big Bang" can be explained, too. It is not an energy from nothing, it is the kinetic and rest energy of fast waves.

As it was mentioned above, quantum mechanics does not permit fermion particles to stay a space smaller than their wavelengths; fast wave may use a similar form of the same law. They turn into particles and waves if the space-matter region is too small. In this case the matter in Big Bang does not have to appear in one single point, it may appear in a region of space. The cosmic inflation of this space region (or point) is brought about by gravity that makes Space waves longer.

Fast wave-wave-particle triality is able to run the world endlessly. The picture of a universe like this is a circle with an arrow. The arrow shows the evolution of the Universe.

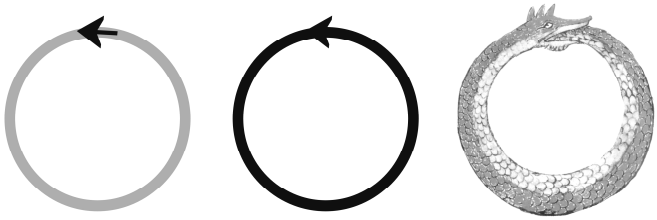

FIG. 28-4 Ouroboros-like Universe.

The first circle with an arrow represents the uninterrupted changes and the continuous renewal of the Universe. The second circle displays the first circle in black and white seems to be an ancient symbol, an ouroboros. Ouroboros is a serpent that eats its own tail. See the third circle with graphic details. Originally it symbolizes the eternal circulation of a self-sustaining system. (Note it was not my goal at all to connect my theory on physics with ancient ideas. The book has written itself this way. Well, that is how the physics of thought is.)

(Credit: Ouroboros, Public Domain, © T. Pelecanos 1478.
It is a copy of the work of Synesius (373-414) Wikipedia.org. Edited)

This model makes many new starts possible on the measurable Universe. The Universe has two parts. The measurable part is the part of particle described in the standard model. The immeasurable part is the part of fast waves. The Universe has no end, just the measurable part will be transformed into the immeasurable one. In this case the part of fast wave contains the whole matter as fast waves. Fast waves will turn into known particles and waves.
In this model the singularity, the inflation and the endless growth of space disappear, while the well-functioning parts of the Big Bang model can still be used.

28.7. More multiverses?

Does the new definition of the Universe change the idea of the multiversum? Yes, it does. If multiversum exists, is it is imaginable for the human mind? Maybe. After all it is brought about of space and matter. In the case of multiversum the universes can be matter, and where there is no universe, there is $space_{Multi}$. If this $space_{Multi}$.is able to wave, there is time in this multiversum that connects the universes. The size of multiversum depends on the velocity of its time and on the action-reaction-time of the universes. But there is a strong rule: nothing, neither matter nor space leaves any universe, each universe is a “closed black box” that cannot be opened.

This multiversum could be a part of a “super multiversum”, where multiverses are matter in $space_{SupMulti}$, …

29. STANDARD MODEL AND SPACE WAVES

As I said earlier, the standard model of physics explains the origin of mass without space waves. The Higgs boson measured in 2013 by CERN[101] gives the mass the "originally massless" fermions, according to the today's physicists.

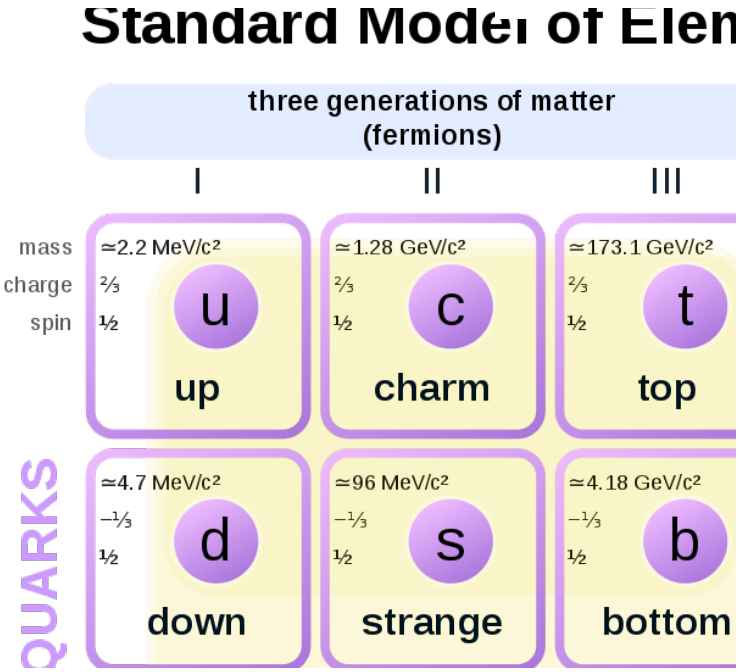

FIG. 29-1 Standard model of elementary Particles.
There are twelve fermions in the standard model.
Six quarks, one electron, one muon, one tau and three neutrinos.
(Nowadays a fourth neutrino is assumed[102].)
Of course there are also antileptons and antiquarks in standard model.
These are not presented here.
(Credit Public Domain © MissMJ, Wikipedia.org.)

29.1. Higgs boson vs. space wave

The Higgs boson also can be given in the special theory as a scalar field. Special relativity describes the changing mass of particles, but it does not explain the origin of mass. The Higgs boson and field try to explain this.

I think Higgs field is like aether in a new form. It is omnipresent anytime. According to Higgs function worked out in 1953 by Novobaczky[103], the mass of a particle depends on the constant of the space and the attributes of the particle. In essence, the experiment of CERN was about a proton-proton collision and its possible decay into two gamma ray photons observed.

Let's see the Feynman diagram[104] of this experiment. The way this diagram works is immaterial now for us. What is important? It is the measured phenomena underlined in the following picture. Since Higgs field and Higgs boson are immeasurable, the existence of the Higgs field is not a criterion of the result measured. There can be space waves instead of Higgs field.

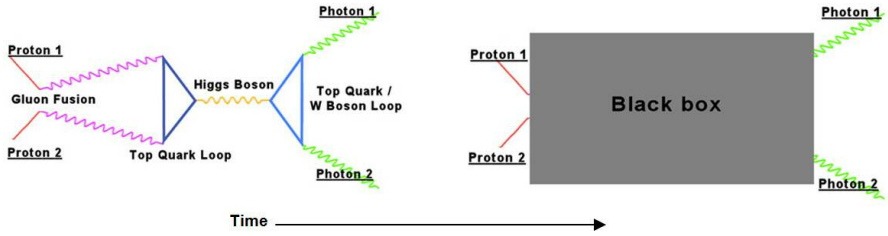

FIG. 29-2 Feynman diagram of the experiment of Higgs boson
and the same experiment as a black box.

Seeing this diagram, we can conclude: CERN measured neither Higgs field nor Higgs boson. CERN measured two photons. The creator of these photons can be Higgs field or Space wave. Whereas in most experiments of CERN's the black boxes are closed, we may accept the existence of Higgs field. But in this given case, namely the case of mass, dealing with Space waves would be a much simpler and more useful solution.

What is Higgs boson according to CERN[105]? The Higgs boson was like a wave on the surface of water, it was the visible manifestation of the invisible and immeasurable Higgs field. And how about this? Space wave is like a wave on the surface of water, it is the visible manifestation of the invisible and immeasurable space.

If space waves, the mass of a particle depends on its own spin and probably on its own other attributes unidentified to this day, and on the characteristics of Space and its waves. This is Novobaczky's statement supplemented with space waves. Theoretically mass can be created with Higgs field or with Space waves. The advantage of Higgs field is that Higgs boson is compatible with Feynman diagrams. In Feynman diagrams nowadays there are no space waves, but there is no reason to stop using them. The disadvantage of Higgs field as opposed to Space wave is that Higgs field is not able to explain gravity, which is well explained by Space waves. And it is not able to connect the general relativity and the standard model which is a deficiency.

Nowadays the latest news from CERN about Higgs boson is that it is able to decay into two muons[106]. Since no other particles e.g. neutrinos are involved here, no missing transverse energy is measured, if I understand the news well. An elemental particle is an ultimate unit that cannot decay, can it?

29.2. Particle charge of and space wave

From the standard model of physics, summarized in FIG. 32-1. above, we know that fermions have charge in addition to their mass. Charge is also a property, it should also have a print (a copy) in space.

Spatial wave is the exact imprint of matter, so it should also include charge. This concept is completely different from the usual ideas of today's physics. Waves of space are now identified (usually and mainly) with gravitational wave.

What is charge? How does space indicate charge? Charge is one of the major quantum numbers of the standard model. It describes symmetry in the behavior of particles, whose expression is the conservation of charge. In the standard model the specific numeric value of charge shows how many times the charge of a particle is smaller than elementary charge. For physics-historical reasons elementary charge is a unit of electric charge of a single proton (or electron). The

elementary charge $e=1.602\cdot10^{-19}$C (C=coulomb), that is one coulomb is equivalent to the charge of approximately 6.242×10^{18} protons.

In quantum physics is elementary charge used, coulomb is not. But now coulomb is important. What is coulomb? It is the charge transported by a constant current of one ampere in one second. 1C=1A·1s.(C=As, amperesecond.)

What is an ampere (A)? The ampere is the base unit of electric current in the SI. 1 ampere (by definition) means a force (of $2\cdot10^7$ newton) that affects an infinite long pair of wires (in vacuum) per meter when the wires are 1 meter apart.

This is the same effect you have seen at the explanation of gravity. The wavelength of space wave between wires and outside wires are different. Force will be created. Saying this, electricity can also be explained by space waves. Without going into details, weak and strong interactions are also explainable with the changes of space wave pressure.

Space wave is the cause of the various interactions that have been sought for hundred years.

With the existence of space waves supposed, numerous old questions can be answered. Space waves are useful for they uncover several new phenomena such as time wave as spatial wave, matter-space, fast wave, etc. They are able to solve more old riddles we have been unable to solve until now. See the next short chapter about the riddles solved.

30. TEN MYSTERIES SOLVED

Ten old mysteries[107] have been solved, although it was not my goal to solve these riddles. I have only wanted to know what thought is. Space-Matter Theory solved the rest of the mysteries.

Nine solved phenomena are listed here:

1. Casimir-effect. It appears as a physical force in quantum mechanics. It happens for instance, if two uncharged conductive plates are placed in a vacuum a few nanometers apart. The plates will be pushed together. Its assumed reason is vacuum fluctuation. I think the Casimir-effect is caused by the difference of pressures of different space waves. There are more and stronger space waves around of the conductive plates than between them.

2. Double-slit experiment.

3. Spooky action at a distance (non-local correlation in quantum entanglement). $\text{Superluminal}_{\text{EMB}}$ velocity.

4. Tunneling.

5. Gravity.

6. Accelerating Universe.

7. $\text{Superluminal}_{\text{M}}$ velocity.

8. Schrödinger-cat paradox.

9. Thought force. Considered non-existent in contemporary physics.

Phenomenon	What causes it?	
	Academic explanation	Explanation in Space-Matter Theory
Casimir-effect	Virtual photon	Space waves of different wavelengths
Double-slit experiment	Particle having an affect on itself. Interference of one particle	Particle travels on interfering space waves
Non-local correlation in quantum entanglement	Spooky action	Space waves modified by photons
Tunneling	Virtual particle	Real particle in a new condition of a different space
Gravity	#1. Curvature of spacetime #2. Hypothetical particle "graviton"	Changing wavelengths of Space wave
Accelerating Universe	Dark energy	Gravity makes wavelengths of Space wave very long. Space grows.
Superluminal_{M} velocity	Unwelcome in theories	Different wavelengths of space waves in different spaces
Schrödinger-cat paradox	Superposition of particle	Space waves
Thought force	It does not exist	Modified space waves that allows the two.way communication

Table 30-1 Space waves are able to solve old mysteries.

Some of these mysteries have been unsolved for more than hundred years. With the existence of Space Waves supposed, the solutions arise. Here we need one phenomenon and not instead of eight-nine different things.

See the difference:

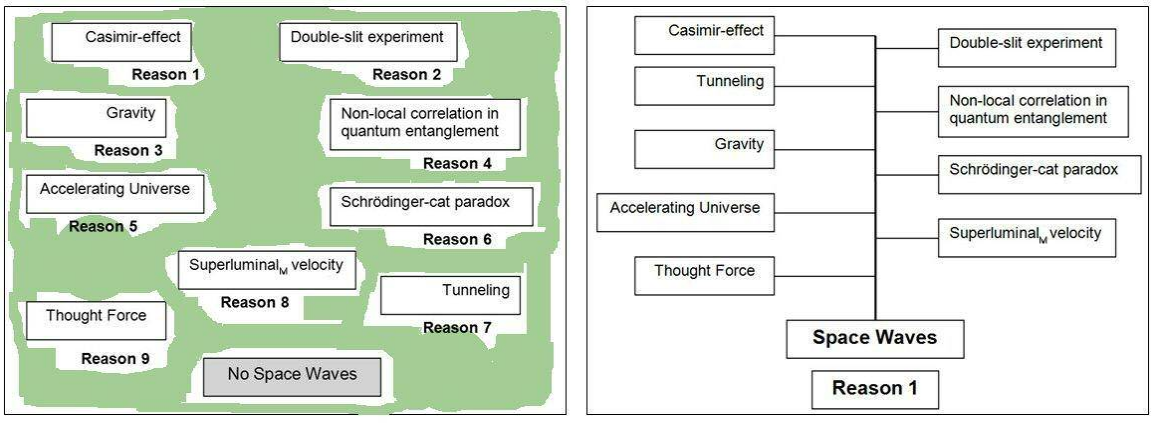

FIG. 30-1 Space waves explain old mysteries.

Axiom that physics is full with mystics that human cannot understand is out of order. (No. 19)

30.1. The tenth mystery: connection between general relativity and the standard model

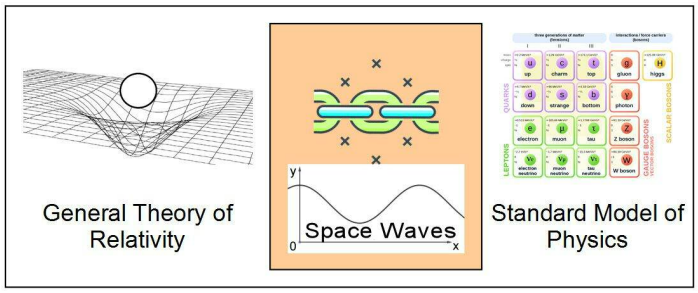

FIG. 30-2 Space waves connect the general relativity and the standard model.
(Credit CC BY–NC–SA 4.0 T. Lajtner, Lajtner.com)

There was a detailed explanation above of gravity expressed as modification of space waves. Space waves also explain how elementary particles can have more superpositions. Space waves connect general relativity and the standard model of physics. This connection remains covered without accepting the existence of space waves.

The mainstream accepts the fact that general relativity is partly false[108], because it does not fit together with quantum mechanics. Physicists seek a theory of quantum gravity.

The Space-Matter Theory can solve this problem.

1) We have to admit, that general relativity is a nice theory.

2) General relativity is only a part of a bigger theory that is unknown as yet.

3) We have to connect the special and general relativity based on Space-Matter Theory.

4) We have to exchange the Einstein tensor for the Wave tensor based on Space-Matter Theory. In plain English, instead of the curvature of spacetime we need the wavelengths and directions of space waves. These are calculable using sophisticated mathematics.

5) We have to accept that gravity can be created by mass, non-mass and even by particles made of space waves.

6) The "new general" relativity must contain more spaces and more times not only the spacetime.

7) These changes of general relativity will connect the two theories.

We have found the bridge between general relativity and the standard model: space waves. The tenth mystery is solved. (E.g. the curvature of spacetime can be expressed via Fourier-transformations.)

30.2. Unknown space waves also modify gravity

The gravity of mass as space wave is marked as a blue cosine function in the two-dimensional model displayed below. The "blue wave" appears as gravity from the viewpoint of mass. This is a set of space waves where the set contains several waves of space created by different properties of the object that are described in general relativity.

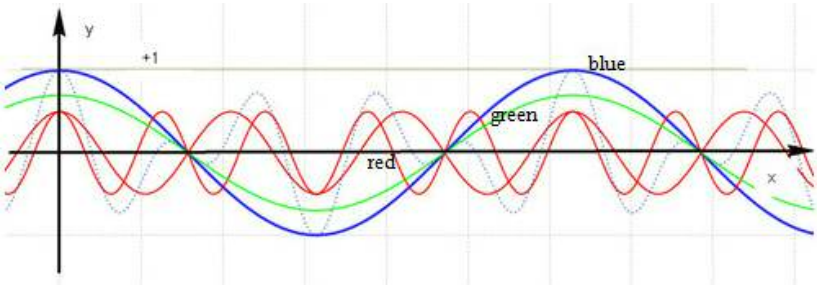

FIG. 30-3 Space waves and gravity of mass.
x and y axes are spatial distances. Two-dimensional model, not proportional.

In FIG. 30–3 there are several unknown waves of space and they are not part of gravity according to general relativity, e.g. the "red and green waves". But they exist and these forces may be able to modify the force of gravity. The existence of these forces is not a mere assumption but a fact. The force of thought runs the paper wheel, ergo it exists. "I think, therefore *it is*." This last sentence is the paraphrase of the famous statement of René Descartes (1596 - 1650): "I think, therefore I am."

30.3. Fifth fundamental interaction

Remember FIG. 8–1. It shows that the forces of thought are able to make "concave" and "convex" curvatures in spacetime, they can be attractive and repulsive. They can increase or decrease the wavelength of space wave, while gravity only increases the wavelengths of space wave.

On the other hand the force of thought like every force has a counterforce, see Chapter 5. This counterforce (force) can be created by any object. Saying this, every mass is able to increase and decrease the wavelengths of space wave, but in this case we are not talking about gravity and not about antigravity. This is a new, the fifth fundamental interaction that modifies space waves. It is not part of general relativity.

This fifth force can be created by living and inanimate. Human beings and other living beings we know use (parts of spectrum of) this force as thought.

30.4. How thought force works

In order to make my book complete, I have to tell you how thought force works.
Thought force works almost like spooky action, it is embedded in time waves.

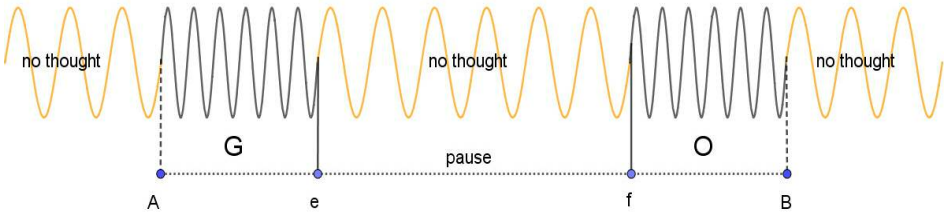

FIG. 30-4 Thought force “GO” embedded in time wave.
Model, not proportional.

The speed of thought force is superluminal$_{EMB}$, but it is slower than the speed of time wave, because of the same effect we have seen in the case of spooky action and tunneling. Here is not about time of developing spins, it is about time we need to put our thought force in space waves. (I intentionally avoid using the expression “modulation of time wave”.)

Axiom of no thought force is out of order. This false axiom in not numbered as mentioned earlier. It is your bonus false axiom that is actually fundamentally wrong, and completely meaningless.
(No. XX Bonus)

31. FORCE I OF ALL

Life is unpredictable. When I finished this book, my electronic thought power meter was not yet working. Now it works, and so I need to complete this book. I was wrong everywhere I wrote that the force of thought, in addition to the four known fundamental interactions, is another fundamental force, that it is the fifth fundamental force.

I am sorry I was wrong.

The force that thought force uses is the one and only fundamental force. The most fundamental force. The well-known four fundamental forces are just different manifestations of this *ultimate* fundamental force. Let's call this *ultimate* fundamental force "Force I" of All. (Its pronunciation is: "Force the First" of All.)

I dare say this based on the following. As it is written in chapter 6.1. we know of four fundamental interactions that are actually two interactions regarding the electroweak force (electromagnetic force + weak force = electroweak force) and the asymptotic freedom that states that in given circumstances electromagnetic, weak and strong forces are the same.

Gravity will always remain an independent force from both the individual and the combined forces.

Using space waves gravity (and the inflation of the Universe) can be well explained as described above.

And here comes up my thought power meter with its new results. It is possible to create changing current in an electric circuit with thought force. It means the thought force is able to move the electrons without electric and/or magnetic fields.

31.1. Paper wheel once more

Let's see the paper wheel experiment once again. Here the paper wheel rotates with thought force. How big is thought force? This question can be answered easily. The calculation is very simple, since we know $m_{paper\ wheel}$ which is the mass of the paper wheel, the drag (air resistance) and the friction and we can measure the time.

The well-known accelerating force in mechanics mentioned several times is the following: $F_a=m_{paper\ wheel} \cdot (v/t)/t$, where t is time and v is the velocity of mass.

We can calculate the force and the energy of thought $E_{Thought}$. $E_{Thought}$ is so big that the electrical signals of brains cannot create it according to the known and measured values of brain signals. This force cannot be the electromagnetic force. The known four fundamental interactions cannot be responsible for this volume of energy. It must be a new fundamental interaction. But what? This question is open and it causes everyone to refuse to accept that the wheel can be run by thought (thought force).

31.2. Lajtner Sensor is a Thought Force Sensor

Lajtner Sensor is a brand new invention. Lajtner Sensor is the first thought force sensor in the world. (lajtner.com/powermeter1.html) What does the first electric thought force sensor in the world show? Here the force of thought changes the current (I) and voltage (U) of the given electric circuit. Let us calculate the changed electric power with our well-known function.

$$P_{Thought}=\Delta U \cdot \Delta I \quad (Watt=Voltage \cdot Ampere). \qquad (31\text{-}1)$$

If we know the power vs. time, we can calculate the energy vs. time with a simple definite integral.

$$\int_{t0}^{t1} P_{Thought}(t)dt = E_{Thought} . \qquad (31\text{-}2)$$

This calculation results in considerable energy, so it confirms the calculated values of energy we measured and calculated when using the paper wheel.

How big is now the force of thought according to the given electric circuit? Here we have two ways to calculate this force. First we can use Eq. (31-3) and (31-4). We know the mass of the electron (m_e) from Standard Model, and n_e means the number of free electrons in the wire.

$$E_{Thought} = (n_e \cdot m_e/2) \cdot v^2_{floating}. \qquad (31\text{-}3)$$

$$F_{a\_Thought\_floating} = (n_e \cdot m_e)(v_{floating}/t). \qquad (31\text{-}4)$$

$$v_{drift} = I/(n_e \cdot Area_{of\ wire\ (cross\ sectional\ area)} \cdot q_e). \qquad (31\text{-}5)$$

$$\alpha_{cor} \cdot v_{floating} = v_{drift} \qquad (31\text{-}6)$$

where α_{cor} is a correction factor. If $\alpha_{cor} \neq 1$, then thought force puts new questions.

Now let us write v_{drift} and m_e into Newton's Second Law.

$$F_{a\_Thought\_drift} = (n_e \cdot m_e) \cdot (v_{drift}/t) \qquad (31\text{-}7)$$

In physics a drift velocity is the average velocity attained by charged particles, such as electrons, in a material due to an electric field. But in the case of thought force there is no electric field causing electrons to move.

Thought force must be generated by the fifth fundamental interaction. This fifth fundamental force is able explain every fundamental interaction known.

By saying this we claim that the four known fundamental interactions are only the four different appearances of this "fifth" fundamental interaction. In this case the "fifth" force is not the fifth one, it is the one and only one. It is Force I. Force I appears as "four fundamental" forces and it exists in its original form.

31.3. Force I of All—The only fundamental interaction

Force I is the interaction between matter and space. Space is a phenomenon which never appears to us as matter. Force I permanently exists as long as there is matter is in space.
According to Newton's Second Law of Motion the accelerating force appears as changes of time and spatial distance. That is, Force I is able to create the electromagnetic interaction. As mentioned earlier, the asymptotic freedom makes it possible to join the electromagnetic force, the weak and the strong interactions at high energies. So these three interactions can be seen as one interaction. Force I creates electromagnetic force, therefore it also creates these three interactions.
Gravity is created by Force I. It is described above.

Summarizing the above-mentioned, Force I generates every known fundamental interaction. It is the only fundamental interaction.
FIG. 31−1. shows it an artistic way.

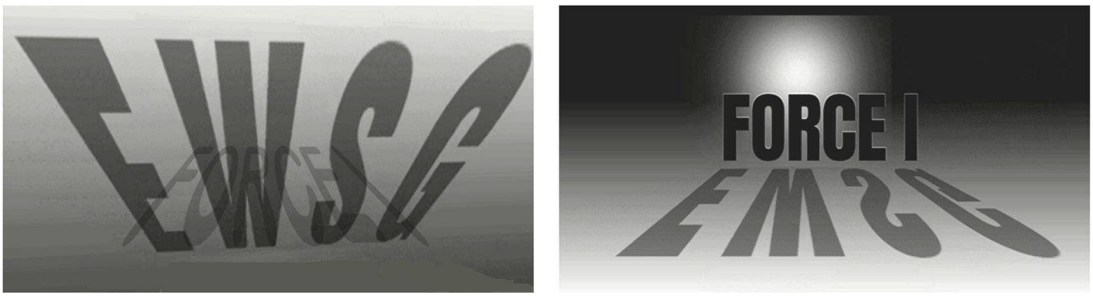

FIG. 31-1 Four fundamental forces we know and the hidden Force I.
The presumption of the four fundamental interactions is not a false axiom, it is a working idea.
If we change our viewpoint, we immediately realize the existence of Force I. Artistic representation.

32. LAJTNER'S LAW OF ENERGY CONSERVATION

The Chapter 26.5 is about the non-local correlation in quantum entanglement known as spooky action at a distance. The measurements by Salart an Yin show that the two photons do not change their spins at the same time. The second photon needs time to change its own spin.
It means, the first photon has changed its spin and the other has not, there is a problem in the law of the conservation of energy.

The only solution to save the law of conservation of energy is that the missing energy not given by the second photon is embedded in space wave created these photons. When the energy embedded in space wave changes the spin of the second photon, the photon creates the missing counter effect and no more the space wave. In other words, the conservation of energy does not work without space waves. The conservation of energy needs both matter and space; it does not work without space i.e. space waves. This is Lajtner's Law of Energy Conservation. Every matter, even photon does have actions in space and space has its counter action.

How long can a particle made of matter exist in the space as modified space time? Planck's constant *h* determines how long a particle created of space can remain in material form, i.e. as an elementary particle. Supposing that the Planck constant also describes the transformation from matter into a space wave, then the highest existing energy can remain as a wave of space for the shortest possible time. This note supplements Chapter 26 on the length of the Universe. Based on this, the measured speed of 10,000-50,000 c of spooky action is not the final limit of information transmission.

33. TAKEAWAY MESSAGE

Axioms of physics are opinions that are disputable. And every now and then we need to rethink them. It is useful if we change our old, out-of-date and false axioms of science and art. The new axioms give us many new results. Using these new axioms, we can extend our knowledge in many new directions. We can draw e.g. the physics of emotions, we can tell what thought force is, we can give new definition of time, space, life and thought.

This book started with a couple of chapters on the force of thought. Now I only give a single remark that refers to the force of thought. Thought force has a given frequency spectrum within space waves. Thought forces are phenomena that are embedded in the modified space waves. The two-way communication that space wave makes possible is essential for thought forces. We can create, send and receive thoughts.

Thought forces have their spectrum. Other forces also can be in this spectrum. From the viewpoint of their sources there are two different forces. The first ones are created by brains. The second ones are created by inanimate (non-living) without brain.

Brain senses forces in this spectrum as thoughts. Saying this, there are thoughts that no brain, and even non-living things created. But they have been created. Somewhere. Everywhere. Continuously. Thought force is a fundamental and universal way of communication in our Universe.

III. APPENDIX: VELOCITY AND FREQUENCY OF TIME WAVE

34. COSINE MODEL OF TIME WAVE—SOME SIMPLE CALCULATIONS

Here are some simple calculations with the cosine model of Space wave. If the model is more accurate, the calculated values will vary, but the principle remains the same. For instance, we can use a three-dimensional model accepting the changing values of gravitational force at a distance and the other factors of gravity from-general relativity. In appropriate form the kind of calculation like the one above can be applied to other spaces. I did not mean to present a closed paradigm, but a new line of philosophy on space and time in context of the force of thought.

34.1. Velocity of Space wave (= time wave)

$$v_{TIME}=s_{meter}/t_{Planck}=1.667\cdot10^{60}\ \text{m/s} \qquad (34\text{-}1)$$

where t_{Planck} is the Planck time[109] $t_{Planck}=5.39\ 10^{-44}$sec. s_{meter} is derived from $E=mc^2=F\cdot s_{meter}$. It is the diameter of a space sphere around the particle that contains modified space waves caused by particle. This space sphere appears as mass of fermions.
$s_{meter}=(2.997\cdot10^{8})^2\approx9\cdot10^{16}$ meters. s_{meter} seems to be an acceptable unit, s_{meter} and the assumed diameter of gravity sphere of the Sun ($\approx2.48\cdot10^{16}$ meters) are in the same order of magnitude.

In function $E=mc^2=F\cdot s_{meter}$ there is no time factor, i.e. this equality is timeless. In other words, time wave has to be able to travel s_{meter} distance during the shortest time period we know. The shortest time period is t_{Planck}, v_{TIME} is the minimum value of the velocity of time wave (Space wave) calculated by the simplified cosine model.

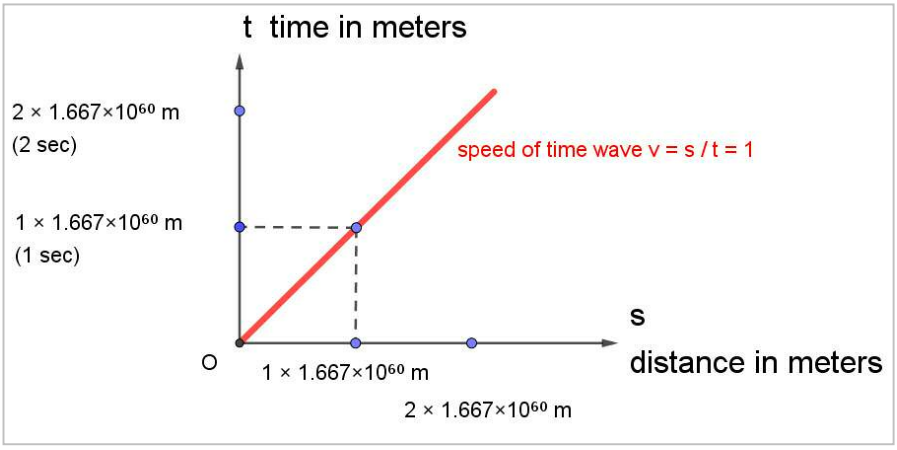

FIG. 34-1 Time wave shows a very different proportion between second and meter compared to light's values. On the other hand, the function $\Delta s/\Delta t=1$ remains true.

At high velocity like this the standing wave model of space wave between particles is possible.

34.2. How many meters is one second?

Anytime and anywhere in Space 1 second is about $1.667 \cdot 10^{60}$ meters. This value is created by Space wave we can calculate, but we cannot measure as yet.

If we measure Space and/or time by means of light, we use a kind of matter that has its own nature. More about in Chapter "Distortion of light".

34.3. How many seconds is one meter?

$$1 \text{ meter} = 1/1.667 \cdot 10^{60} = 5.99 \cdot 10^{-61} \text{sec.} \qquad (34\text{-}2)$$

1 meter is $5.99 \cdot 10^{-61}$ seconds according to FIG: 33–1. This value is lower than–Planck-time, therefore for us it is a mere theoretical value. For Space it is a real time period.

34.4. Frequency of Space wave (= time wave)

The frequency of Space wave (= time wave) is the following, using a simple cosine function as Space wave.

$$f_{TIME} = v_{TIME}/\lambda_{TIME} = 1.031 \cdot 10^{95} \text{sec}^{-1} \qquad (34\text{-}3)$$

$\lambda_{TIME} = 1.61\ 10^{-35}$ meters, this is the Planck-length[110], the shortest distance we know.

The frequency of the time wave (Space wave) cuts one second into $1.031 \cdot 10^{95}$ time-pieces. One piece is the shortest time period in Space. We cannot measure it yet, but for Space it exists.

So if we stress the *frequency of the Space wave*, we are speaking of *time*.

34.5. "Plank-constant" of Space wave (= time wave)?

E_{TIME} can be calculated supposing a theoretical, non-existing photon where $\lambda_{light} = \lambda_{TIME}$, and using the Planck law as a pattern that light shows. Light is supposed to have adopted this law from the wave of time.

$$E_{TIME} = f_{TIME} \cdot h_{TIME} = f_{light} \cdot h \qquad (34\text{-}4)$$

$$v_{TIME}/\lambda_{TIME} \cdot h_{TIME} = h \cdot c/\lambda_{light} \qquad (34\text{-}5)$$

$$h_{TIME} = h \cdot c/v_{TIME} = 1.191 \cdot 10^{-85} \text{ Js} \qquad (34\text{-}6)$$

34.6. How much energy is one second?

Second can be expressed as energy. $E_{1sec} = h_{TIME} f_{TIME}$, because f_{TIME} is the number of impulses of time wave in 1 second.

$$E_{1sec} = 1.23 \cdot 10^{10} \text{ J} = 7.67 \cdot 10^{28} \text{ eVolt} \qquad (34\text{-}7)$$

according to the cosine model. If Space exerts energy, we "feel" it as time.

Time waves (Space waves) are not any kind of matter, but its "action", its "energy" can be described with our physics units of matter. We have to be very careful with expressions like "action of time wave", "energy of time wave" etc., because action and energy etc. are the characteristics of matter.

34.7. How much energy is one meter?

If we wish to express our terms of physics' units of distance using the attribute of Space wave made by mass, we may do so. If we take our unit of spatial distance one meter, space waves show us how to build that unit from the smallest possible spatial parts. The shortest spatial distance is given by the wavelength of the space wave. $1\text{meter} = k_{TIME} \cdot \lambda_{TIME}$ where k_{TIME} is the wave number of

space wave (time wave). Using space waves that have energy, we can also give one meter as energy. Or we can use Eq. (33–2) and (33–7) in Eq. (33–8).

$$E_{1meter}=1.23\cdot10^{10}\cdot5.99\cdot10^{-61}=7.37\cdot10^{-51}\ J=4.6\cdot10^{-32}\ eVolt. \qquad (34\text{-}8)$$

One meter is $4.6\cdot10^{-32}$ eVolt energy according to the cosine model.

You can compare the presented values with the well-known value[111]: 1 kg is $5.61\cdot10^{35}$ eVolt. Now you can express meters and seconds in kgs or in pounds. And vice versa.

FIG. 34-2 Without title.
(Credit © T. Lajtner, Lajtner.com)

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REFERENCES

[1] Nagel, Sidney. ”Physics in Crisis” *Physics Today* Vol. 55, I 9, p. 55 (2002); https://doi.org/10.1063/1.1522217, https://physicstoday.scitation.org/doi/10.1063/1.1522217. 2002

[2] Cossins, Daniel. ”*’We’ll die before we find the asnwer’: Crisis at the heart of physics”* New Scientist. https://www.newscientist.com/article/mg24132130-600-well-die-before-we-find-the-answer-crisis-at-the-heart-of-physics/. Januar 2019

[3] Hossenfelder, Sabine. ”Was läuft falsch in der gegenwärtigen Physic” Lecture on Youtube. https://www.youtube.com/watch?v=99hVAu1k6G8. 2019

[4] Casimir, H. B. G., Polder D. “The Influence of Retardation on the London-van der Waals Forces.” *Phys. Rev.* 73, 360. 1948.
https://journals.aps.org/pr/abstract/10.1103/PhysRev.73.360

[5] Merli, P G,. Missiroli G F, Pozzi G.”On the statistical aspect of electron interference phenomena.” *Am. J. Phys.* Vol. 44. Issue 306. https://doi.org/10.1119/1.10184 1976.

[6] Lajtner, Tamás.”Thought Force Is a New Fundamental Interaction.” *Physics Essays*, Vol 29, No 2, June 2016, pp. 239-247(9) DOI: https://doi.org/10.4006/0836-1398-29.2.239/
https://www.ingentaconnect.com/contentone/pe/pe/2016/00000029/00000002/art00016 2016.

[7] Lajtner, Tamás.”A gondolat ereje.” Filozofia.hu. http://filozofia.wplanet.hu/fv-tortenet-2013.html 2013.

[8] Tasnádi, Péter, Berces György and Skrapits Lajos , *Általános fizika. Mechanika I.* Budapest*:* Dialogus Campus Kiado, 2013.

[9] Buzsaki, György *Rhythms of the Brain*. Oxford: Oxford University Press, 2006 .
https://www.researchgate.net/publication/223130267_Rhythms_of_The_Brain

[10] Hughes, John R. “Gamma, fast, and ultrafast waves of the brain: their relationships with epilepsy and behavior.” *Epilepsy & Behavior*, July 2008, Vol. 13, Issue 1, pp. 25-31. DOI: https://doi.org/10.1016/j.yebeh.2008.01.011 2008.

[11] Fourier, Joseph. *Théorie analytique de la chaleur.* Paris: Chez Firmin Didiot, Pére et Fils, 1822.
https://www.irphe.fr/~clanet/otherpaperfile/articles/Fourier/N0029061_PDF_1_676.pdf

[12] Williams, R.W., K. Herrup. “The control of neuron number.” *Annual Review of Neuroscience* 11; 423-453.
https://doi.org/10.1146/annurev.ne.11.030188.002231.
https://www.annualreviews.org/doi/abs/10.1146/annurev.ne.11.030188.002231
1988.

[13] Planck, Max. “Zur Theorie des Gesetzes der Energieverteilung im Normalspectrum.“ *Verhandlungen der Deutschen Physikalischen Gesellschaft* 2, 237. https://doi.org/10.1002/phbl.19480040404 1900.

[14] Planck, Max. “Über die Elementarquanta der Materie und der Elektricität.“ *Annalen der Physik* 1901, 4: 564-566. https://doi.org/10.1002/andp.19013090311. 1901.

[15] Planck, Max. “Über das Gesetz der Energieverteilung im Normalspectrum.“ *Annalen der Physik* 1901, 4: 553-563. DOI: 10.1002/andp.19013090310. 1901.

[16] ”REG Experiments: Equipment and design.” Princeton.edu. http://noosphere.princeton.edu/rdnelson/reg.html, http://www.princeton.edu/~pear/ 2010.

[17] Lajtner, Tamas. *Thought is Force (Live, Love, Soul, God).* Amazon 2019.

[18] Newton, Isaac. *Philosophiae Naturalis Principia Mathematica.* London, 1687. http://www.gutenberg.org/files/28233/28233-h/28233-h.htm

[19] Bilenky, S.M., J. Hosek."Glashow-Weinberg-Salam theory of electroweak interactions and the neutral currents." *Physics Reports* Volume 90, Issue 2, October 1982, pp. 73-157, https://doi.org/10.1016/0370-1573(82)90016-3 1982.

[20] Gross, David J., Frank Wilczek. Ultraviolet Behavior of Non-Abelian Gauge Theories, *Phys. Rev. Lett.* 30, 1343. https://doi.org/10.1103/PhysRevLett.30.1343 1973.

[21]Politzer, David H."Reliable Perturbative Results for Strong Interactions?" *Phys. Rev. Lett.* 30, 1346, 25 June 1973) DOI:https://doi.org/10.1103/PhysRevLett.30.1346 1973.

[22] Einstein, Albert. "Zur Elektrodynamik bewegter Körper." *Annalen der Physik* 17, 891-921. http://myweb.rz.uni-augsburg.de/~eckern/adp/history/einstein-papers/1905_17_891-921.pdf 1905.

[23] Einstein, Albert. " Relativitätsprinzip und die aus demselben gezogenen Folgerungen," *Jahrbuch der Radioaktivitaet*. 4, 411-462. http://www.soso.ch/wissen/hist/SRT/E-1907.pdf 1907.

[24] Einstein, Albert. "Über die vom Relativätsprinzip geforderte Trägheit der Energie." *Annalen der Physik.* 23. 371-384. http://myweb.rz.uni-augsburg.de/~eckern/adp/history/einstein-papers/1907_23_371-384.pdf 1907.

[25] Einstein, Albert. „Formale Grundlage der allgemeinen Relativitätstheorie." *Preussische Akademie der Wissenschaften, Sitzungsberichte*. pp. 1030-1085. https://onlinelibrary.wiley.com/doi/pdf/10.1002/3527608958.fmatter 1914.

[26] Einstein, Albert."Zur allgemeinen Relativitätstheorie." *Preussische Akademie der Wissenschaften, Sitzungsbericht.* pp. 778-786, 799-801. https://onlinelibrary.wiley.com/doi/pdf/10.1002/3527608958.fmatter 1915.

[27] Einstein, Albert. (1915) "Feldgleichungen der Gravitation." *Preussische Akademie der Wissenschaften, Sitzungsberichte*. pp. 844-877. https://onlinelibrary.wiley.com/doi/pdf/10.1002/3527608958.fmatter 1915.

[28] Einstein, Albert. (1916) "Grundlage der allgemeinen Relativitätstheorie." *Annalen der Physik.* Vierte Folge, 49, pp. 769-822. http://myweb.rz.uni-augsburg.de/~eckern/adp/history/einstein-papers/1916_49_769-822.pdf 1916.

[29] Khamehchi, M. A., Khalid Hossain, M. E. Mossman, Yongping Zhang, Th. Busch, Michael McNeil Forbes, and P. Engels. "Negative-Mass Hydrodynamics in a Spin-Orbit–Coupled Bose-Einstein Condensate." *Phys. Rev. Lett.* 118, 155301
https://doi.org/10.1103/PhysRevLett.118.155301 2017.

[30] Kim, Sang-Woo. Jun Nishimura, Asato Tsuchiya Expanding"(3+1)-Dimensional Universe from a Lorentzian Matrix Model for Superstring Theory in (9+1) Dimensions." *Phys. Rev. Lett.* 108, 011601. https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.108.011601 2012.

[31] Castellani, Elena."Scientific Methodology: A View from Early String Theory." Archive.org. pp. 7-10. 2018. https://arxiv.org/pdf/1802.03850.pdf

[32] Oerter, Robert. *The Theory of Almost Everything: The Standard Model, the Unsung Triumph of Modern Physics*. New York: Pi Press, 2006.
ISBN 0-13-236678-9 https://www.amazon.com/Theory-Almost-Everything-Standard-Triumph/dp/0452287863

[33] Taylor, Edwin F., John A Wheeler. *Spacetime Physics.* pp. 3, San Francisco, London: W. H. Freeman and Co, 1963.

[34] Walter, Ulrick."Spacetime: Das Licht." DokuPeter. 2018. https://www.youtube.com/watch?v=Q9T4hO8o3Mg

[35] Minkowski, Hermann. “Space and Time.” Minkowskiinstitute.org. 1908.
http://www.minkowskiinstitute.org/mip/MinkowskiFreemiumMIP2012.pdf

[36] SI Brochure, The International System of Units (SI) “Unit of length (metre).” Bipm.org. 2014.
https://www.bipm.org/en/publications/si-brochure/metre.html

[37] SI Brochure, The International System of Units (SI) “Unit of time (second).” Bipm.org. 2014.
http://www.bipm.org/en/publications/si-brochure/second.html

[38] Schleicher, dIRK. ”Hausdorff dimension, its properties, and its surprises.” *American Mathematical Monthly* 114, pp. 509-528 https://arxiv.org/abs/math/0505099 2007.

[39] G. Kantor, Georg.”Über unendliche, lineare Punktmannichfaltigkeiten.” *5. Fortsetzung. Mathematische Annalen* / Zeitschriftenband (1883) / Zeitschriftenheft / Artikel / 545 - 591
http://www.digizeitschriften.de/main/dms/img/?PPN=GDZPPN002247461 1883.

[40] Higgs, Peter.”Broken symmetries and the masses of gauge bosons.” *Phys. Rev. Letters* 13 (16): 508–509. 1964.
https://pdfs.semanticscholar.org/e1c3/e5b653a13cea9c4ac636588724ccf0a2365e.pdf

[41] ATLAS; CMS (2015). "Combined Measurement of the Higgs Boson Mass in pp Collisions at √s=7 and 8 TeV with the ATLAS and CMS Experiments". *Physical Review Letters.* 114, 191803. 2015.
https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.114.191803

[42] Bonesini M. „The proton radius puzzle.” Arxiv.org. 2017. https://arxiv.org/abs/1612.07684

[43] Easton, Roger. “SIMG-455 Physical Optics, SPSP-455 Optical Physics.” pp. 94-95. Chester F. Carlson Center for Imaging Science Rochester Institute of Technology. 2008. https://www.cis.rit.edu/class/simg455/SIMG-455_notes_20073b.pdf

[44] Gauthier Daniel J., Robert W. Boyd . “Fast light, Slow light and Optical Precursors: What does it all mean?” Photonics.com. 2007.
http://www.photonics.com/Article.aspx?AID=27833.

[45] Univ. of Rochester. “Light's Most Exotic Trick Yet: So Fast it Goes ... Backwards?” Rochester.edu. 2006.
http://www.rochester.edu/news/show.php?id=2544

[46] Kondakci, H. Esat, Abouraddy, F.Ayman. “Optical space-time wave packets having arbitrary group velocities in free space.” *Nature Communications* Vol. 10. Article number: 929. 2019
https://www.nature.com/articles/s41467-019-08735-8

[47] Kirilyuk, Andrei. *75 Years of Matter Wave: Louis de Broglie and Renaissance of the Causally Complete Knowledge*. Kiev: Inst. Metal Phys., 1999.
https://arxiv.org/ftp/quant-ph/papers/9911/9911107.pdf

[48] Nimtz, Günter, A. Enders, H.Spieker. “Photonic tunneling times.” *J. Phys. I France* Vol. 4. Numeéro 4. pp. 565-570. 1994.
http://jp1.journaldephysique.org/articles/jp1/abs/1994/04/jp1v4p565/jp1v4p565.html.

[49] Nimtz, Günter.”Tunneling: From Milliseconds to Attoseconds.” Arxiv.org. 2018.
http://arxiv.org/pdf/0903.2582v1.pdf

[50] Nimtz, Günter. “Tunneling Confronts Special Relativity.” *Foundation of Physics* Vol. 41. Issue 7. pp. 1193-1199. 2011.
https://link.springer.com/article/10.1007/s10701-011-9539-2

[51] Nimtz, Günter. ”Tunneling Violates Special Relativity.” Arxiv.org. 2018.
http://arxiv.org/pdf/1003.3944v1.pdf

[52] Lajtner, Tamás. ”Spaces and Velocities.” Vixra.org. 2016. http://vixra.org/abs/1608.0247

[53] Lajtner, Tamás. ”Four Mysteries Solved: Double-Slit, Spooky Action, Tunneling, and Accelerating Universe.” *European-American Journal* Vol 4. No. 3. pp.13-40. 2016.
http://www.eajournals.org/wp-content/uploads/Four-Mysteries-Solved-Double-Slit-Spooky-Action-Tunneling-and-Accelerating-Universe.pdf

[54] Nimtz, Günter, A. Enders, H. Spieker. ”Photonic tunneling times.” *Journal de Physique I, EDP Sciences*, Vol. 4 (4), pp.565-570. 1994.
https://hal.archives-ouvertes.fr/jpa-00246930/document

[55] Nimtz, Günter, A. Enders, H. Spieker.”Universal Relationship of Time and Frequency in Photonic Tunneling.” *Ann. Phys. (Leipzig)* 10 (2001) 8, pp. 707—712; and datas from Dr. Nimtz’s record that hasn’t been published with the article) 2001.

[56] Enders A., Nimtz G.”On superluminal barrier traversal.” *J. Phys. I. France* 2 pp. 1693-1698. 1992.

[57] Ramos R, Spierings D, Racicot I and Steinberg A. M. ”Measurement of the time spent by a tunnelling atom within the barrier region.” *Nature* 583, pp. 529–532. 2020
https://arxiv.org/pdf/1907.13523.pdf 2019.

[58] Einstein. Albert.“Ist die Trägheit eines Körpers von seinem Energieinhalt abhängig?“ *Annalen der Physik.* 18. pp. 639–643. 1905.

[59] Einstein, Albert. *Über die spezielle und allgemeine Relativitätstheorie.* Berlin: Springer, (2001).

[60] Braun, S., J.P. Ronzheimer, M. Schreiber, SS. Hodgman, T. Rom, I. Bloch, U. Schneider.“Negative Absolute Temperature for Motional Degrees of Freedom.” *Science* Vol. 339. Issue 6115. pp. 52-56. 2013.
DOI: 10.1126/science.1227831 http://science.sciencemag.org/content/339/6115/52/tab-pdf

[61] Nimtz, Günter.”Do Evanescent Modes Violate Relativistic Causality?” *AIP Conference Proceedings* 841, 348. https://doi.org/10.1063/1.2218191 2006.

[62] Lorentz, Hendrik A. "Electromagnetic phenomena in a system moving with any velocity smaller than that of light", *Proceedings of the Royal Netherlands Academy of Arts and Sciences*, 6: pp. 809–831. 1904.

[63] Cherenkov, Pavel. A. "Visible emission of clean liquids by action of γ radiation". Doklady Akademii Nauk SSSR. 2: 451. 1934.

[64] S. Perlmutter, S., G. Aldering, G. Goldhaber, R. A. Knop, P. Nugent, P. G. Castro, S. Deustua, S. Fabbro, A. Goobar, D. E. Groom. ”Measurements of Ω and Λ from 42 High-Redshift Supernovae.” *The Astrophysical Journal*, Vol. 517. Number 2. 1999.
http://iopscience.iop.org/article/10.1086/307221

[65] Riess, Adam, Alexei V. Filippenko, Peter Challis, Alejandro Clocchiattia, Alan Diercks, Peter M. Garnavich, Ron L. Gilliland, Craig J. Hogan, Saurabh Jha, Robert P. Kirshner at al. ”Observational Evidence from Supernovae for an Accelerating Universe and a Cosmological Constant.” Arxiv.org. 1988. https://arxiv.org/abs/astro-ph/9805201

[66] Einstein, Albert, B. Podolsky, N. Rosen.”Can quantum-mechanical description of physical reality be considered complete?” *Phys. Rev.* 47, 777. 1935.
https://journals.aps.org/pr/issues/47/10

[67] Schrödinger, Erwin. ”Die gegenwärtige Situation in der Quantenmechanik.” *Naturwissenschaften* 23, pp. 807–812. 1935.

[68] Wineland, David.”Superposition, Entanglement, and Raising Schrödinger’s Cat.” Nobel Lecture. 2012.

https://www.nobelprize.org/uploads/2018/06/wineland-lecture.pdf

[69] Hacker, Bastian. Stephan Welte, Severin Daiss, Armin Shaukat, Stephan Ritter, Lin Li, Gerhard Rempe. ”Deterministic creation of entangled atom–light Schrödinger-cat states” *Nature Photonics* Vol.13, pp. 110–115 https://doi.org/10.1038/s41566-018-0339-5 2019.
Paper: https://www.nature.com/articles/s41566-018-0339-5.epdf?referrer_access_token=UWuEoYDyAfWnCYkJDde5E9RgN0jAjWel9jnR3ZoTv0M5ItQx6PKR1SP49kqgQY-XMokVKXx-3bP-kfWnr8MvmKHnsmaG3CKy1oMSo0vNQzzyHyybMetmAHAOst2qWCyGEzqfzCXOBEpJdW-FdEFxvnmcMdfstRp9YNFxryKkQiygfSIhxfxK36pTs4Eg2mxiLoQfwSxO7ZMI1YYmhs8049RK7msY-48mqoZuGDDRCq1kPX-v0641dZgKBF8FeZIE&tracking_referrer=www.spektrum.de

[70] Nagy, Sándor. ”A részecskefizika Standard Modellje.” Nemo. 2004. http://nagysandor.eu/nuklearis/NEMO_sm.htm

[71] Hulse, R.A., J.H. Taylor. ”A hight-sensitivity pulsar survey.” *The Astrophys. J.* 191. pp. 59-61. 1974. http://adsabs.harvard.edu/full/1974ApJ...191L..59H

[72] Hulse, R.A., J.H. Taylor. ”Discovery a pulsar in a binary system.” *The Astrophys. J.* 195. pp. 51-53. 1975. http://adsabs.harvard.edu/full/1975ApJ...195L..51H

[73] Press Release.”The 1993 Nobel Prize in Physics.” Nobelprize.org. 1993. http://www.nobelprize.org/nobel_prizes/physics/laureates/1993/press.html

[74] Tang, KeYun. ChangCai Hua, Wu Wen, ShunLiang Chi, QingYu You, Dan Yu. „Observational evidences for the speed of the gravity based on the Earth tide.” *Chinese Sci. Bull.* Vol. 58. Issue 4-5. pp. 474-477. 2013. https://link.springer.com/article/10.1007%2Fs11434-012-5603-3

[75] Flandern, Tom von. ”The speed of gravity—What the experiments say.” *Phys. Letters A.* 250, Issues 1-3. pp. 1-11. 1998.

[76] News Release of LIGO. ”Gravitational waves detected 100 years after Einstein’s prediction.” Caltech.edu. 2016. https://www.ligo.caltech.edu/system/media_files/binaries/302/original/detection-press-release.pdf

[77] Connaughton, Valerie, E. Burns, A. Goldstein, L. Blackburn, M. S. Briggs, B.-B. Zhang, J. Camp, N. Christensen, C. M. Hui, P. Jenke, at al.”FERMI GMB observations of LIGO gravitational-wave event GW150914.” *The Astrophys. J. Letters* Vol. 826. No 1. 2016. https://iopscience.iop.org/article/10.3847/2041-8205/826/1/L6/meta

[78] ”Did a Gamma Ray Burst Accompany LIGO’s Gravity Wave Detection?” Universetoday.com. 2016. http://www.universetoday.com/127463/did-a-gamma-ray-burst-accompany-ligos-gravitational-wave-detection/

[79] Loeb, Abraham.”Electromagnetic Counterparts to Black Hole Mergers Detected by LIGO.” Arxiv.org. 2016. http://arxiv.org/abs/1602.04735

[80] McGaugh, Stacy S. Vera C. Rubin, W. J. G. de Blok.”High-Resolution Rotation Curves of Low Surface Brightness Galaxies. I. Data.” *The Astronomical Journal*, Vol. 122. N 5. 2001. http://iopscience.iop.org/article/10.1086/323448/meta

[81] Müller, Oliver, Marcel S. Pawlowski, Helmut Jerjen, Federico Lelli. “A whirling plane of satellite galaxies around Centaurus A challenges cold dark matter cosmology.” *Science* Vol. 359. Issue 6375. pp. 534-537. 2018. DOI: 10.1126/science.aao1858 or https://arxiv.org/abs/1802.00081,

[82] Tully, R. Brent, J. Richard Fisher. "A new method of determining distances to galaxies". *Astronomy and Astrophysics*, Vol. 54, No. 3, pp. 661–673. 1977. http://articles.adsabs.harvard.edu/cgi-bin/nph-iarticle_query?1977A%26A....54..661T&data_type=PDF_HIGH&whole_paper=YES&type=PRINTER&filetype=.pdf

[83] Wald, Robert. M.”Gravitational collapse and cosmic censorship" Arxiv.org. 1997. https://arxiv.org/abs/gr-qc/9710068

[84] Nasa.”Black holes.” Nasa.gov. 2018. https://science.nasa.gov/astrophysics/focus-areas/black-holes

[85] Wald, Robert. M. *General Relativity.* Chicago: University of Chicago Press, 2010. https://books.google.hu/books?id=9S-hzg6-moYC&redir_esc=y

[86] Seeds, Michael. A., Dana E. Backman. *Perspectives on Astronomy*. Belmont: Thomson Brooks/Cole, 2007. https://books.google.com/books?id=CXom04KGIL8C&pg=PA167

[87] ESO. ”Most Detailed Observations of Material Orbiting close to a Black Hole.” Eso.org. 2018. https://www.eso.org/public/news/eso1835/?lang

[88] Abuter, Roberto, A. Amorim, M. Bauböck1, J. P. Berger, H. Bonnet, W. Brandner, Y. Clénet, V. Coudé du Foresto, P. T. de Zeeuw, C. Deen1, J. Dexter1, at al.”Detection of orbital motions near the last stable circular orbit of the massive black hole SgrA.” *Astronomy and Astrophysics* Vol. 618. L10. 2018. https://www.aanda.org/articles/aa/abs/2018/10/aa34294-18/aa34294-18.html

[89] ”Measuring the shape of the Milky Way's black hole.” Phys.org. 2016. https://phys.org/news/2016-06-milky-black-hole.html

[90] Werner, Norbert. ” Óriási fekete lyukak és egy darabokra hullott műhold története.” Magyar Csillagászati Egyesület. 2017. https://www.youtube.com/watch?v=i6BS9668yaE

[91] NASA. ”Universe older than previously thought.” Nasa.org. 2013. https://science.nasa.gov/science-news/science-at-nasa/2013/21mar_cmb

[92] Macaulay, E., R. C. Nichol, D. Bacon, D. Brout, T. M. Davis, B. Zhang, B. A. Bassett, D. Scolnic, A. Möller, C. B. D'Andrea, et al.”First cosmological results using type la supoernovae frem the Dark Energy Surey: measurment of the Hubble constant.” Arxiv.org. 2018. https://arxiv.org/abs/1811.02376

[93] Harrison, Edward. *Masks of the Universe.* pp. 206. Cambridge: Cambridge University Press, 2003. https://books.google.hu/books?id=tSowGCP0kMIC&pg=PA206&redir_esc=y&hl=hu#v=onepage&q&f=false

[94] Csótó, Attila. ”Emberközpontú Világegyetem?” ATOMKI MTA. 2018. https://www.youtube.com/watch?v=ZMJK_NvxmqM

[95] Bars, Itzhak, John Terning. *Extra dimensions in space and time*. pp. 27. New York: Springer, 2009. https://books.google.hu/books?id=fFSMatekilIC&pg=PA27&redir_esc=y#v=onepage&q&f=false

[96] A. Friedman,. "Über die Krümmung des Raumes". *Zeitschrift f. Physik* Vol. 10 Issue 1. pp. 377–386. doi:10.1007/BF01332580. 1922

[97] European Space Agency. ”Planck Publications: Planck 2015 Results.” Esa.int. 2015. https://www.cosmos.esa.int/web/planck/publications

[98] NASA.”What is the Universe made of?” Nasa.org. 2015. https://wmap.gsfc.nasa.gov/universe/uni_matter.html

[99] J-PARC E15 collaboration, S. Ajimuraa, H. Asanob, G. Beerc, C. Beruccid, H. Bhange, M. Bragadireanuf, P. Buehlerd, L. Bussogh, M. Cargnellid, S. Choi at al. “’K−pp’, a -meson nuclear bound state, observed in 3He(K−,Λp)n reactions” *Phys. Letters B* Vol. 789, , pp. 620-625. 2019. https://doi.org/10.1016/j.physletb.2018.12.058

[100] Liang, Qi-Yu. Aditya V. Venkatramani, Sergio H. Cantu, Travis L. Nicholson, Michael J. Gullans, Alexey V. Gorshkov, Jeff D. Thompson, Cheng Chin, Mikhail D. Lukin, Vladan Vuletić. ”Observation of three-photon bound states in a quantum nonlinear medium.” *Science.* Vol. 359, Issue 6377, pp. 783-786. 2018. DOI: 10.1126/science.aao7293, http://science.sciencemag.org/content/359/6377/783

[101] Gray, Heather, Bruno Mansoulié."The Higgs boson: the hunt, the discovery, the study and some future perspectives." Atlas.com. 2018.
https://atlas.cern/updates/atlas-feature/higgs-boson

[102] Aguilar-Arevalo, A. A., B. C. Brown, L. Bugel, G. Cheng, J. M. Conrad, R. L. Cooper, R. Dharmapalan, A. Diaz, Z. Djurcic, D. A. Finley, et al."Significant Excess of Electronlike Events in the MiniBooNE Short-Baseline Neutrino Experiment." *Phys. Rev. Lett.* 121, 221801, 2018.
https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.121.221801

[103]Novobatzky, K. F. "Zur Schrödinger‐Gordon‐Gleichung." *Annalen der Physik* Vol 446, Issue 4-7. pp. 285-292. https://doi.org/10.1002/andp.19534460407 1953.

[104] Kaiser, David."Physics and Feynman's Diagrams." *American Scientist.* 93(2). pp. 156-165.
http://web.mit.edu/dikaiser/www/FdsAmSci.pdf 2005.

[105] CERN. "The Brout-Englert-Higgs mechanism." Cern.org. 2013.
https://home.cern/science/physics/higgs-boson

[106] CERN Press release about Higgs bozon that decays into two muons. Cern.org. 2020. https://home.cern/news/press-release/physics/cern-experiments-announce-first-indications-rare-higgs-boson-process 2020.

[107] Lajtner, Tamás. "Four Mysteries Solved: Double-Slit, Spooky Action, Tunneling, and Accelerating Universe." *Int. Res. J. of Pure and App. Phys (IRJPAP)* Vol 4, Issue 3, pp. 13-40. www.eajournals.org 2016.

[108] Hossenfelder, Sabine. "How we know that Einstein's General Relativity can't be quite right." Lecture on Youtube. 2019. https://www.youtube.com/watch?v=Ov98y_DCvRY&t=13s.

[109] CODATA. "Planck time." Nist.gov. 2014.
https://physics.nist.gov/cgi-bin/cuu/Value?plkt|search_for=planck

[110] CODATA."Planck length." Nist.gov. 2014.
https://physics.nist.gov/cgi-bin/cuu/Value?plkl|search_for=planck

[111]CODATA. "Conversion from kg to eV." Nist.gov. 2014. http://physics.nist.gov/cgi-bin/cuu/Convert?exp=0&num=1&From=kg&To=ev&Action=Convert+value+and+show+factor

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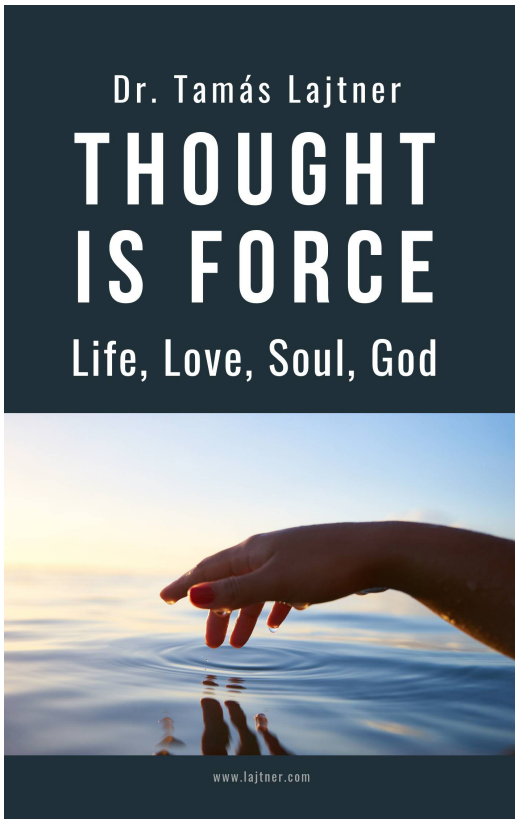

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