Q-space theory:
An attempt to unify physics

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Part A: Preview to Q-space.

Article 2: A preview to the review of physical geometry.

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Contents:

Quick index for new concepts

Along the articles of Q-space theory many new concepts are presented. The following table includes only the new concepts relevant to this article and refers the reader directly to their definition (in this article as well as in the previous one). If you encounter one of these new concepts, but forget its definition, use this table, in order to quickly navigate in the article and refresh your memory. The definitions of concepts, which were first defined in article 1, are only briefly given in this article. Readers that seek deeper understanding are referred through this table also to the original and detailed definitions in article 1. The concepts in this table are ordered alphabetically.

New concepts	**Definition in:**			
	Article 2		**Article1**	
	Section	**Line**	**Section**	**Line**
Analytic acceptance	2.1	35	1.2	160
Analytic explanation	2.1	40	1.2	169
Analytic understanding	2.1	47	1.2	242
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The physical geometry sequence	2.2	102	—	—
Total acceptance	2.1	57	1.2	266
Total understanding	2.1	60	1.2	269

2.1 Reminder

In the first article of "Q-space theory" I claimed that modern physicists are experiencing a "**physical intuition crisis**". This crisis was caused during the 20th century, due to our inability to **intuitively** understand the major discoveries of relativity and quantum physics.

Since the **intuitive** understanding (or **mis**understanding) of the conclusions of modern physics was the subject under discussion, we had to define what "intuitive understanding" is, and what is the difference between "intuitive understanding" to "**analytic** understanding". In order to accomplish this mission, a set of new concepts was defined and explained in detail.

- Remark: If you haven't read the first article it is essential you do so before you continue with this one, otherwise the content of this article and the following ones will be misunderstood (All published articles can be downloaded freely from my web site)[1]. A reader that will try to rely only on this short reminder (and skip the first article) will definitely extract much less knowledge out of this article and all the following ones.

Understanding the essence of the concepts, which were defined in article 1, is necessary for the understanding of all the following articles. Thus, their definitions are once again given here. However, the definitions given here are presented without examples. If you feel that a certain definition needs more clarification, you may use the "**quick index for new concepts**" in order to return directly to the original definition (and its examples) in article 1.

These are the relevant definitions from article 1:

Intuitive acceptance: The acceptance of a certain phenomenon based on an **imaginable picture** of it.

Analytic acceptance: The acceptance of a given phenomenon based on experimental results and/or scientific logic. By "scientific logic" I mean an argument based on a given axiomatic system, which does not contradict any former experimental result.

Analytic explanation: The explanation of a given phenomenon based on a scientific logic and not only on experimental results.

Intuitive explanation: The explanation of a given phenomenon based entirely on **imaginable pictures**, by means of **other** more fundamental phenomena, which have previously been intuitively accepted.

[1] www.Q-spaceTheory.org

2.1 Reminder

Analytic understanding: If we can **analytically** explain a given phenomenon, then we say that we have an "analytic understanding" of it.

Intuitive understanding; If we can **intuitively** explain a given phenomenon, then we say that we have an "intuitive understanding" of it.

Intuition problem: If a certain phenomenon, concept or result in a given theory cannot be intuitively **accepted**, although it **can** be **analytically** accepted, then we would say that this phenomenon is an "intuition problem" of the given theory.

Total acceptance: If a given phenomenon is both analytically and intuitively **accepted**, then we may say it is "totally accepted".

Total understanding: If a given phenomenon is both analytically and intuitively **understood**, then we may say it is "totally understood".

An additional remark concerning "intuitive acceptance" and "intuitive understanding": I based the definitions of these concepts on imaginable pictures, i.e. on a visual basis. But it would be wrong to say that **any** intuitive acceptance/understanding we experience is visual. Sounds, tastes, smell, touch and emotions are all phenomena, which should also be considered as intuitively acceptable/understandable. Furthermore, I received complains that different people may have different definitions for "intuitive understanding" and I should not narrow it down so much by my definition. I agree with these claims in the general sense. But **in the context of Q-space theory** the visual based definition as given above is satisfying and the whole theory can be explained on its basis. So forgive me if you have a different definition for "intuitive understanding" or "intuitive acceptance". I am certainly not demanding a monopoly on these concepts.

After presenting and explaining these concepts, we reviewed **the major intuition problems of modern physics:**

1. Length/time contraction/dilation.
2. Bent spaces (with more than 2 dimensions).
3. The non-deterministic nature of quantum physics.
4. The duality of light and mass.
5. The tunnel effect.

I also mentioned **the lack of a unified physical theory** as one of the greatest problems of modern physics. This problem is both analytic and intuitive.

Then we had to make a choice between two philosophical options:

a. There is no intuitive explanation for all the presented problems; hence the only way to proceed towards the unification of physics is analytically. We may even accept the idea that a complete theory is beyond our reach both intuitively **and** analytically.

b. We assume that an intuitive understanding of modern physics **is** possible, although it is totally unclear how at the moment. Furthermore, once we achieve an intuitive understanding we may **see** how to unify physics in a simple intuitive way. Of course the analytic understanding will follow.

We chose option b, and then we asked, for every one of the 5 intuition problems, the following question: "In order to intuitively understand the given problem what material must we review?"
Surprisingly, analyzing 4 of the intuition problems led to the same answer: **There is a fault in our space-time conception. In order to find this fault we must review our geometry.**

Only the intuition problem regarding the non-deterministic nature of quantum physics was exceptional. The last problem could be solved by a unique intuitive explanation. But its semi-spiritual nature led us to a dead end as far as physics is concerned. Furthermore it is not totally obvious that the non-deterministic nature of quantum physics is not related to the same geometric fault joint to all the other intuition problems. Hence we made the following assumption:

Geometry is the intuition sub-problem of modern physics.

I defined "**physical geometry**" as the geometry applied in physics and stated that we need only to review the **physical** geometry. We don't need to review any type of geometry or "space" that isn't applied in the fundamental laws of relativity and quantum physics.

In this article and the following ones we will review the physical geometry in order to extract its intuition problems. We will be motivated by the assumption that solving these problems is the key for intuitively understanding modern physics. Such an understanding will enable us (later on) to reach a **total** understanding of modern physics and may reveal the "**physical missing link**". Eventually, the discovery of the physical missing link will lead us directly to the unification of physics.

Let the review of physical geometry begin…

2.2 A preview to the review of physical geometry.

Until this point I have only mentioned the concept "**physical geometry**", without explaining what it practically includes. In this section I will briefly mention which geometry is used for the **mainstream** relativity, quantum physics and string theory. Then I will provide a list of geometric subjects that will be reviewed and reexamined in the following articles.

Relativity and quantum physics together include all the fundamental laws of mainstream modern physics. String theory is still under examination and far from being a convention at present time (fall 2007), but it will have an important role later on in Q-space theory, thus I will refer to its geometry too. Other **classic** physical theories, such as Newtonian physics, electromagnetism and thermodynamics are regarded today as private cases of relativity and quantum physics (at least in theory). As such they do not need to be treated separately.

I am aware, that some of the readers of my articles do not have a solid background in modern geometry. For these readers I will just recommend not to be bothered if they do not understand certain concepts, which are given in **this** section. Any relevant information for Q-space theory will be presented in detail (starting from the next section that is actually in the next article) when it will be needed. I believe that any reader with high school education in math and basic knowledge in physical popular science will be able to keep tracking my articles. For the benefit of such readers I will add special appendixes explaining the relevant mathematical knowledge that is needed in order to understand the subjects under discussion.

Let us now specify which types of geometry are included in "physical geometry" (in the context of Q-space theory):

In Quantum physics:

Quantum mechanics tends to relate more to spaces of states (of a system), then to "our" space. Each physical system is associated with a "separable complex Hilbert space". From this space a specific state of a physical system can be calculated. The relation to "our" space was pointed out by Max Born, who interpreted the square of the wave function as a probability amplitude in an "**Euclidean space**". The use of other spaces can be regarded (in my opinion) as an elegant (and most practical) mathematical manipulation, but not as a proper description of **our** space. This does not mean that I totally accept Born's interpretation. I intend to offer new interpretations to the wave function **and** its square when I will explain the essence of particles (it will take a few years before we reach that point).

There may be additional types of geometry used in **today's** quantum physics. I do not claim to know them all. But I developed Q-space theory based on the knowledge above, which reflects the classic geometric approach of quantum physics, and I claim my knowledge is sufficient for the production of the

unified theory. I know this may sound pretentious at this point, but if you keep on reading the following articles, then I believe you will gradually understand how and why I got the "impudence" and confidence needed in order to make such statements.

In relativity:
Relativity is based on "**pseudo-Riemannian geometry**", which is tangent to "**Minkowski space**".

In string theory:
String theory simply uses "**Euclidean space**", but must do so with multiple dimensions in order to supply reasonable results.
Once again, there may be other types of geometry also used in string theory, and I do not claim to know them all. But for the sake of the discussion in Q-space theory they will not be needed.

For conclusion, physical geometry (as far as I knew when I developed Q-space theory) is consistent of "Euclidean space" and a "pseudo-Riemannian geometry", which is tangent to "Minkowski space". Initially I tried to save time and explain all the intuition problems of physical geometry directly on these spaces, without reviewing previous types of geometry. But I quickly understood that such an attempt does not serve my interest.

My initial results (which came prior to the review of physical geometry) showed that the metrics used in these modern types of geometry are **physically** wrong. In the case of "Euclidean space" this **seemed** to imply that not only is the definition of "length" by a generalization of the Pythagorean relation physically wrong, the Pythagorean **theorem** itself is physically wrong!

But the Pythagorean theorem itself seems to be well proved in ancient Greek geometry and Euclidean spaces are generalizations of the Greek geometry. Thus I could not claim that the Pythagorean theorem is physically wrong without reviewing the foundations of ancient Greek geometry and discovering its faults. This was the motivation to start a long and interesting journey, in which I restudied the foundations of all previous types of physical geometry. While doing so my main attention was given to the refinement of the intuition problems out of the theories.

This process gave me a thorough understanding (so I believe) of how certain problems were solved while others were ignored. It gave me an opportunity to see and understand how philosophies gradually changed to solve new problems, while abandoning and discarding ancient wisdom. Each new geometry **did have** great contributions, and they will all be combined in Q-space geometry (as approximations of private cases). But in some cases, the philosophic **interpretation** of a given geometry became a convention without proper evidence. As a result, we begun to limit our minds and imagination and pushed our selves **away** from the total understanding of the physical universe. The review of physical geometry, that we are now beginning, will expose these problems and open our minds to an **allegedly** new geometric conception. Eventually we will discover that the new conception, which will lead to Q-space theory is actually very ancient…

2.2 A preview to the review of physical geometry.

Article 3 will be the first in a sequence of articles which will all begin with "**Physical geometry:…**". For example article 3 will be named "Physical geometry: Intuition problems originating from misinterpretations of Euclid's definitions". I will refer to these articles as "**The physical geometry sequence**".

<u>The physical geometry sequence will review and reexamine the subjects listed below:</u>

1. **Greek geometry.**
2. **Irrational numbers.**
3. **Analytic geometry.**
4. **Space continuity.**
5. **Euclidean spaces.**
6. **Imaginary numbers.**
7. **Minkowski space.**
8. **Riemannian geometry.**
9. **Pseudo-Riemannian geometry.**

Along the way we will refine the relevant intuition problems out of these subjects. We will not only specify the intuition problems, we will **confront** them and most of them **will** be solved within the physical-geometry sequence!

As a result, important conclusions regarding the essence of our space will be reached even **before** the physical-geometry sequence ends. However several problems will still remain unsolved and only Q-space geometry will later on fill the gaps.

Every one of the subjects listed above will be the issue of at least one article and some of them will demand several articles. Greek geometry for example will demand at least 3 articles. All of these articles will still just belong to the preview to Q-space theory.

I believe that an extremely long preview to Q-space theory, is necessary. Explaining Q-space theory too soon will be out of context and its postulates will seem unjustified. On the other hand, after the preview articles, which will expose many unnoticed new problems and reveal the possible conclusions, Q-space theory will naturally be accepted (so I hope).

From the next article we will start to "dig in" to the essence of physical geometry. We will begin by reanalyzing the most ancient mathematical book that survived in whole, and was constantly used along the last 23 centuries: "**Euclid's Elements**".