Article

The key to the Theory of Everything is: $c\ m\ day/r_{Earth\ equator}^{\ 2} = 2/\pi$

Introduction

In the standard model of elementary particles [1,2] there are 28 constants, in which 6 quarks, 3 leptons, 3 neutrinos, the Higgs-boson and the interaction constants for gravity, electromagnetic, weak and strong forces are the best known. One building block of physics is the electron, which is assumed to be a point, although it is subject to gravity and electromagnetic forces. Wave-particle dualism, Schrödinger's cat and the hierarchy problem are expressions of this lack of understanding.

Natural philosophy began with ideas about the cosmos. According to Democritus, there are an infinite number of atoms that have always existed [3,4]. They differ quantitatively in shape and size, but were made of the same ur-particles substance. They move in the "emptiness" (vacuum). The set of natural numbers is therefore the basis for physics, both with the number of "atoms" and a measurement. According to Demokit, the number space with past, future, ur-particles and vacuum can be translated into comparisons, i.e. rational numbers Q. Physics is knowledge from the past, and thus the numbers without zero: Q^+. In the following, ur-particles are used for the smallest particles to avoid confusion with other theories. The name goes back to C.F. von Weizsäcker's idea of ur-alternatives [5,6]. Quantum information developed from this.

Ptolemy observed the celestial bodies and described them with epicycles [7,8]. Every observation of an object is a measurement and can be described by 3 location coordinates, longitude, latitude and radius. A measurement always requires a comparison of two objects O_2, O_1 by a solid, neutral measuring device O_0 at a common point in time. A clear measurement is only possible through coincidences of the 3 spatial coordinates (longitude φ, radius r , latitude θ) after half or a full rotation of 2π.

Archimedes' achievements include a proof of the lever law. The measuring device O_0 has a pivot point for comparing two objects O_2, O_1. Regardless of whether one compares O_2, O_1 in kg or in the number of Ur-particles n_2 or n_2, the lever arms r_1 and r_2 are in the reciprocal ratio $r_1/r_2 = n_2/n_1$. This comparison is valid for one dimension. Archimedes also extended this idea to surfaces and led to the concept of the center of gravity. In other words, the measurements for two or three orthogonal spatial dimensions are independent of each other.

Galileo Galileo wrote a treatise on the Ptolemaic and Copernican world systems in 1630 [9]. In it he wrote that the speed of light will decide which world view is correct. This idea is the beginning of the theory of relativity. Galileo's theory of the tides served as the strongest argument for the Copernican system. For every observer, the speed of light c is the same in every direction.

Is there more knowledge in quantum physics than is possible in the ideas of philosophers and physicists in antiquity? Why is quantum theory still not united with general relativity after 124 years? Do quantum theory and general relativity differ only by a mistake in the way they are measured?

1. Importance of an energy measuring device

What can people observe with measuring instruments? This means that there is only one equation for energy and it is the sum of powers of $g(2\pi)^d$. $g \in \mathbb{Q}$ stands for ratios that are measurable, $d \in \mathbb{Z}$ stands for different dimensions. If the energy is normalized to the rest mass of the electron, the energy with the frequency f results in 3 spatial dimensions:

$$E_e = E_\varphi + E_r + E_\theta = g_f\pi + 1 - 1/\pi \tag{1}$$

For a photon:

$$E_{Photon} = E_f + E_r + E_\theta = g_f(2\pi) + n/g_f e^{-i2\pi f} - n/(2\pi) \quad (2)$$

E_r is the length of the wave train and on average $E_r = g_r = 0$. It is the pivot point between $E_f = g_f(2\pi)$ and $E_\theta = -n/(2\pi)$.

The number of ur-particles in the earth is not known. The relationship between space and time is determined by the speed of light c. A thought experiment is required to unite quantum theory with general relativity.

2. Normalization of m from c on the earth's surface and one day - a thought experiment

The system of sun, earth and the bound moon is unique in the planetary system. The rotation of the firmament determines the direction in which a Foucault pendulum moves [10].

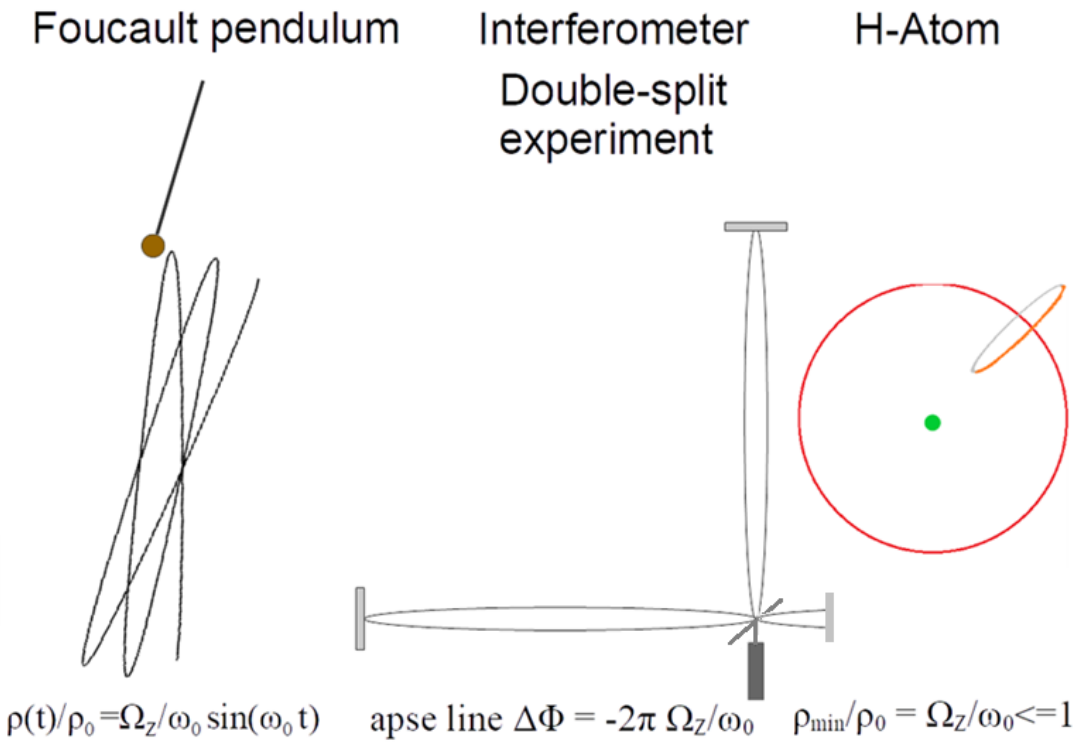

Figure 1. Foucault pendulum - Interferometer - atom

In the laboratory, light deflections occur. This also applies to the movement of an electron $E_e = g_{freq}\pi - 1 - 1/\pi$ around an atomic nucleus.

The relevant equations for the pendulum are (Figure 1):

Diameter of the Earth	$D_{Earth\ equator} = 12756,27km$
Angular velocity	$\Omega = 2\pi/(86164s)$
Deflection	$\rho(t)/\rho_0 = \Omega_Z/\omega_0 \sin(\omega_0 t)$
Rotation of the apsidal line	$\Delta\Phi = -2\pi\Omega_Z/\omega_0$
Center:	$\rho_{min}/\rho_0 = \Omega_Z/\omega <= 1$

The energy of the pendulum is minimal $0 < \rho_{min}/\rho_0 = \Omega_Z/\omega_0 <= 1$.The pendulum does not pass through the center of the apse line. If this is applied to the light beam of a Michelson interferometer, it is also bent. For a photon that moves between the mirrors for a day within the apse line $\Delta\Phi = -2\pi\Omega_Z/\omega_0$ is obtained. For the Foucault pendulum, this corresponds to a complete circle of 2π and the spin 1 of the photon. The light beam is attracted to the earth and can be described with the syndic period using the formula c m day. c is the only parameter required as a replacement for the number of unknown particles N_{Earth}. The area A

$$\Delta\vec{A} = \Delta\vec{g}_{Earth\ equator\ lowtide} \times \Delta\vec{g}_{Earth\ equator\ hightide} \propto h\nu = E_{photon} \tag{3}$$

moves with rotation time in 4-dimensional space, whereby the angular momentum between the earth and the photon is conserved. The opposite pole to the photon is the Earth with an area ${D_{Earth\ equator}}^2$. The ratio is $1/(2\pi)$, similar to the lever law.

$$c\ m\ 86400s/{D_{Earth\ equator}}^2 = 1/(2\pi) \tag{4}$$

This formula can be exact if the contour line is above zero 489 (e.g. the 1000 km wide Congo Basin is just under 500 m from the Pacific Ocean). Thus $2\pi r_{Äquator}$ is a string (string theory) or loop (loop quantum gravity) arising from the universe. The formula is more precise than $G_N = 6.67430(15)10^{-11}m^3/kg/s^2$ [11]. It allows a simple, interpretation of forces, which is based solely on the number of ur-particles in 4D space-time. The Foucault pendulum, orthogonal to the Earth's axis, rotates with the siderial periodial of 86186 s [10]. General relativity explains the difference to the syndic period of the entire system of sun, moon, ecliptic, precession and nutation.

In the polynomial $E_\gamma = E_\varphi + E_r + E_\theta = g_f(2\pi) + n/g_f e^{-i2\pi f} - n/(2\pi)$ of a photon, $E_r = n/g_f e^{-i2\pi f}$ is the length of the wave train and on average $E_r = 0$. $-n/(2\pi)$ gives the gravity. $E_r = 0$ is the pivot point between $E_f = g_f(2\pi)$ and $E_\theta = -n/(2\pi)$. $n/g_f e^{-i2\pi f}$ and $-n/(2\pi)$ are 2 components of the spin. Depending on the direction of propagation of the photon, the spin is made up of these two components, but remains orthogonal to the neighboring object. Only when an elementary particle has returned to its starting point is the spin completely measured. In the case of the earth, this is one day. This formula has been proven by the universe. It contains all relevant parameters, 3 dimensions, m, day, 2π. The mathematics behind this is simple. The opposite cannot be proven with additional constants. ex falso quodlibet.

The photon can be explained by the superposition of two electrons, or an even number of ur-particles. When meters are standardized with c, the light beam is bent in the laboratory. This also applies to the movement of an electron around an atomic nucleus. In the ground state, $g_f\pi = 0$ and the electron consists of 2 ur-particles. They never intersect the atomic nucleus! This means that the wave-particle discussion is irrelevant. Spin and Coriolis force have the same cause. **The spin points in the direction of the gravity of a neighboring object**.

The laboratory for standardizing the unit m with the speed of light c
rotates once a day.

3. Neutron

As a neutral elementary particle, the neutron is the easiest of all elementary particles to calculate. Just like in the system (sun-earth-moon), at least 3 x 3 location coordinates are required and the time of

measurement. The starting point for calculating the rest mass of the neutron is a comparison of the simplest polynomials $P(2\pi)$ E_2 and E_1 with a minus for attraction.

$$E_2 = (2\pi)^4 + (2\pi)^3 + (2\pi)^2 \qquad E_1 = -((2\pi)^1 + (2\pi)^0 + (2\pi)^{-1}) \tag{5}$$

From the energies $E_{2,1}$ follows analogously to Newton's law of gravitation $F = m_1 m_2 / r^2$ or the law of refraction for a curved surface [12] or with the general theory of relativity (Christoffel symbol) [13,14].

$$E_{0,space} = 2(2\pi)^{-2} + 2(2\pi)^{-4} - 2(2\pi)^{-6}$$
$$E_{0,time} = 6(2\pi)^{-8} \tag{6}$$

$$m_{Neutron}/m_e = (2\pi)^4)^3 + (2\pi)^2 - (2\pi)^1 - (2\pi)^0 - (2\pi)^{-1} + 2(2\pi)^{-2} +$$
$$2(2\pi)^{-4} - 2(2\pi)^{-6} + 6(2\pi)^{-8} = 1838.6836611 \tag{7}$$

Theory: 1838.6836611 m_e **Measurement: 1838.68366173(89)** m_e **[11]**

In general, an algorithm similar to the lattice gauge theory of quantum chromodynamics [1,2] is required. In two program loops (for E_2 and E_1), $E_{0,space}$ and $E_{0,time}$ are calculated step by step. The dimensions φ, r, θ are denoted by $\lambda \in \{4,3,2\}$ for E_2 and $\nu \in \{1, 0, -1\}$ for E_1.

$$\begin{aligned}
&for\ \lambda = \varphi_2\ to\ \theta_2\ step - 1 \\
&\quad for\ \nu = \varphi_1\ to\ \theta_1\ step\ -1 \\
&\qquad if\ g_{2,\lambda} > 0\ then\ E_{0,-\lambda-\nu-1} = -sgn(\nu) g_{2,\lambda} g_{1,\nu} (2\pi)^{-\lambda-\nu}/\pi \\
&\qquad if\ g_{2,\lambda} < 0\ then\ E_{0,-\lambda-\nu} \ = -sgn(\nu) g_{2,\lambda} g_{1,\nu} (2\pi)^{-\lambda-\nu}\ 2 \\
&\qquad E_{0,t} = |g_{2,\lambda} g_{1,\nu}| (2\pi)^{-2\varphi_2} \\
&\quad next \\
&next
\end{aligned} \tag{8}$$

The starting value are those of objects 1 and 2 and are calculated for object 0 with the reciprocal of the corresponding dimension, the exponent $-\lambda - \nu$. This geometric mean also contains the factor $1/\pi$ or 2. If this factor were 1, there would be straight lines in the cosmos. For a curved space, the factor $1/\pi$ is minimal. The equation

$$E_{0,-\lambda-\nu-1} = -sgn(\nu) g_{2,\lambda} g_{1,\nu} (2\pi)^{-\lambda-\nu}/\pi \tag{9}$$

is the core of the algorithm. The structure corresponds to a Christoffel symbol from general relativity:

$$\Gamma^{\mu}_{\lambda\nu} = g^{\mu\rho}(\partial_\lambda g_{\nu\rho} + \partial_\nu g_{\lambda\rho} - \partial_\rho g_{\lambda\nu}) \tag{10}$$

It is essential that the partial derivatives for the dimensions are replaced by quanta $\partial_d = 1/\pi$.

$$E_{0,-\lambda-\nu} = -sgn(\nu) g_{2,\lambda} g_{1,\nu} (2\pi)^{-\lambda-\nu} 2 \tag{11}$$

contains negative energies of E_2, i.e. antimatter. This also makes it possible to calculate other elementary particles such as muons, tau and pions. If $g_{2,\lambda}(2\pi)^\lambda = 0$, a pair of neutrinos and antineutrinos can arise. Another interpretation of a system by $P(2\pi)$ is the reflection/inversion of the external worlds of O_2 and O_1 into the internal world O_0 of the observer on the unit circle $e^{i2\pi+\Psi}$. In lattice gauge theory, the action S is also summed over loops (Wilson loops). The normalization for lattice gauge theory is based on the coupling constants, while the algorithm is based on powers of π.

The calculation requires only 10 terms and is therefore the most efficient method for determining $m_{neutron}/m_e$**. This result is unique due to the transcendental numbers** π^d**.**

In Figure 2, φ, r and θ are arranged in a half wave. The algorithm is a Fourier transformation from the outer wave (6 terms) into the quantum information of the inner world (6 prefactors). The question of dimensions in space is secondary in this theory. The rest mass of a neutron $P(2\pi)$ can be formulated in 10 dimensions, or in our imagination in 4 dimensions (t, φ, r, θ , Poincare group $\mathbb{R}^{3+1}$), or in one dimension in the network our brain. The increase of dimensions d by $P(\pi)$ for the binding energy is consistent with the no-go theorem "all possible symmetries of the S matrix" [17].

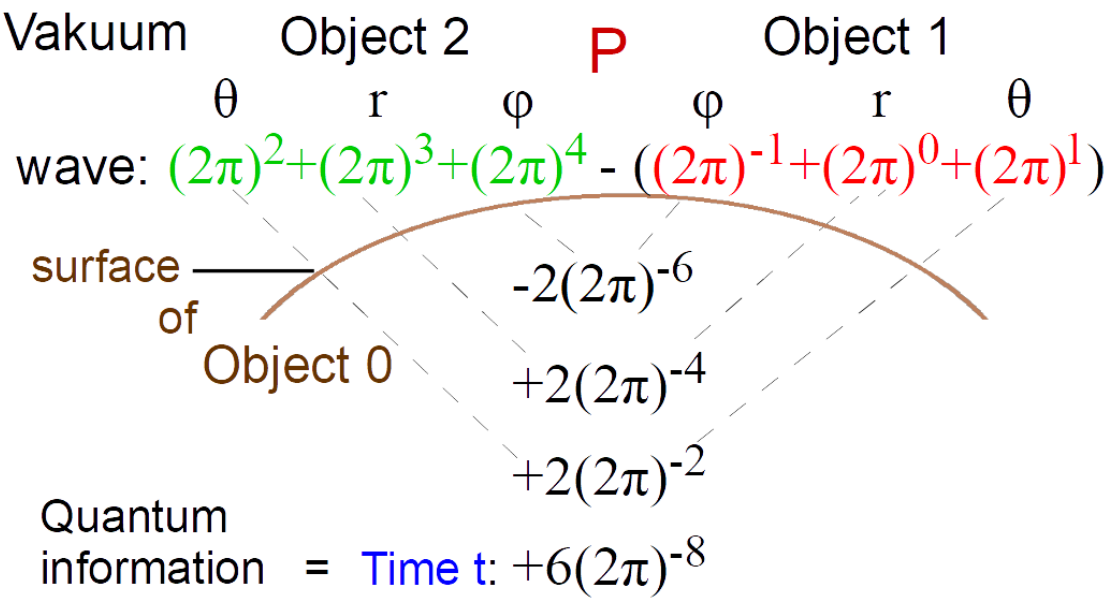

Figure 2. $m_{Neutron}/m_e$ as a polynomial $P(2\pi)$

4. Proton

The number system of π is unique: If the electron mass is normalized to 1, the spin must be a rational number of $1/\pi$. Every frequency of an electron is $g_f \pi$. Every neutron or proton must contain $(2\pi)^4$, $(2\pi)^3$ and $(2\pi)^2$. The binding energy for the charge and the spin are polynomials $P(\pi)$.

The electric charge should correspond to three neutrinos, with a mass difference between neutrons and protons. This results in 3 quarks (uud). The approach for the energy of the charge E_{C+} is itself a system of 3 objects ($E_{C,2}, E_{C,1}, E_{C,0}$). π^{φ} and π^{θ} rotate around the center $\pi^{r} = 1$, with the minimum energy $E_{C,2,1}$ similar to the Coriolis force:

$$E_{C,2,1} = -\pi^{1} + 2\pi^{-1} < 0 \quad (12).$$

The decimal places $E_{C,0} = E_{C,0,space} + E_{C,0,time}$ result from a series expansion of π^d. The decimal places of the neutron $E_f = 2(2\pi)^{-2} + 2(2\pi)^{-4} - 2(2\pi)^{-6} + 6(2\pi)^{-8}$ contain only even powers. $E_{C,0}$ fills the odd powers. A further explanation for this is speculative. It is assumed that after 4 spatial dimensions the type of neutrinos remains the same with ${\nu_{\varphi}}^{-4}$ and ${\nu_{\theta}}^{-4}$:

$$E_{C,0,space} = -\pi^{-3} + 2\pi^{-5} \quad (13)$$

The next step is $E_{C,0,time}$, additionally with a neutrino oscillation in the gravitational field to ${\nu_{\mu}}^{-12}$.

$$E_{C,0,time} = -\pi^{-7} + \pi^{-9} - \pi^{-12} \quad (14)$$

Together with the neutron mass, this gives the proton mass (Figure 3):

$$E_{C+} = -\pi^{1} + 2\pi^{-1} - \pi^{-3} + 2\pi^{-5} - \pi^{-7} + \pi^{-9} - \pi^{-12}$$
$$m_{Proton} = m_{Neutron} + E_c m_e = 1836.15267363\ m_e \quad (15)$$

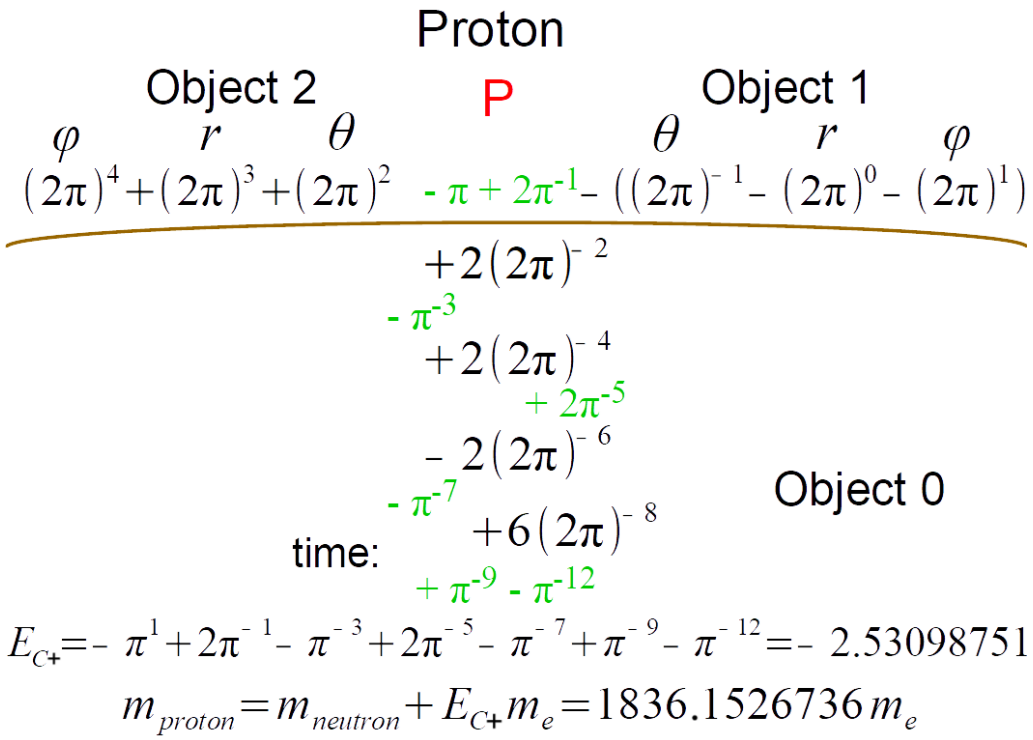

Figure 3. m_{Proton}/m_e as a polynomial $P(2\pi)$

$$m_{Proton}/m_e = (2\pi)^4 + (2\pi)^3 + (2\pi)^2 - (2\pi)^1 - (2\pi)^0 - (2\pi)^{-1} + 2(2\pi)^{-2} + 2(2\pi)^{-4} - 2(2\pi)^{-6} + 6(2\pi)^{-8} + (-\pi + 2\pi^{-1} - \pi^{-3} + 2\pi^{-5} - \pi^{-7} + \pi^{-9} - \pi^{-12}) = 1836.15267363 \quad (14)$$

Theory: 1836.15267363 m_e **Measurement: 1836.15267343(11)** m_e [11]

5. Fine structure constant α

Using the simple concept of the Bohr atomic model, $c\ \alpha$ is the speed of the electron in orbit. In the ground state, $g_{\varphi,e} = 0$. For the bonding of the electron, $g_{r,e} = -1$ applies. An approximation for $1/\alpha$ is:

$$1/\alpha \approx \pi^4 + \pi^3 + \pi^2 - 1 - \pi^{-1} + ... = 136.96$$
$$\text{Measurement } 1/\alpha = 137.035999177(21) \quad (16)$$

The calculation is accurate to ‰. Whether the further series expansion follows a logic or is limited by the gravitational constant requires further research

Summary and Conclusion

A basic principle of the theory is that the ur-particles are countable. The energies are polynomials of powers of π. The summands in the polynomials $g_d(2\pi)^d$ are orthogonal to each other and unique for the dimensions d. The formula $c\ m\ day/r_{Earth\ equator}{}^2 = 2/\pi$ depends only on the speed of light c and is thus the key to unifying quantum theory with general relativity. The rest masses of electrons,

neutrons and protons can only be calculated using polynomials with the basis π. For neutral objects, $P(2\pi)$ applies. Binding energies for the spin and charge also contain $P(\pi)$. $P(2\pi)$ are complete and, according to Ockham's razor, give the shortest possible formulas for energies. The action, energy, angular momentum and mass ratios of the elementary particles can be expressed in a single line. The theory explains the wave-particle duality and the hierarchy problem. $2\pi r_{Äquator}$ can also be interpreted as a string (string theory [16]) or loop (loop quantum gravity [17]), which is a part of the cosmos. Depending on the size of the system being investigated, different constants such as G_N, c, h, α and the Rydberg constant are useful. It can be assumed that the 28 constants for elementary particle physics can be replaced by powers of π.
The theory could significantly change our understanding of the universe.

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