In this text is explained why our universe exists and why there are nature's laws.
The explanation is given in two parts:
Part 1: Why does our universe exist?
Part 2: Why does nature's laws exist?
The explanation uses concrete examples, to make the text as comprehensible as possible.
At the end is a complete example of a mini universe (that of course exists) where two simple elementary particles and multiple physical laws exist.

Scientific justification

The theory is in accordance with the scientific approach (step 1,2,3):
1. We start with an observation:
We notice that our universe exists.
2. We set up a theory to explain this observation.
It is evident that the theory must have the potential to explain everything that happens in our universe, and definitely may not be in conflict with any observation.
The approach is that the theory itself is build up, starting from what inevitable exists, and applying logical conclusions to this. Therefore it's in fact no theory, but a prove with as conclusion that all kinds of universes inevitable exist.
3. From the theory follows predictions of other observations.
The theory covers the explanation of the whole universe. So, besides the fact that the theory should explain everything that happens in our universe, there is nothing else to explain in our universe.

Part 1: Why does our universe exist?

Before a whole universe can exist, we should of course first explain how something can exist.
We will set up a reasoning related to the existence of forces, and extend it afterwards to the existence of other physical quantities.

Consider a force F = 1 Newton, with a given direction and sense
It is obvious that:
5 F = 3 F + 2 F = 7 F – 2 F = 5 F + 0 F = …
So, there are an infinite number of possibilities to write 5 F, that are all completely equivalent with 5 F.
For 0 F the same reasoning can be made.
0 F = 5 F – 5 F = 5 F – 2 F – 2 F – 1 F = …
Again there are an infinite number of possibilities to write 0 F.
We will call "0 multiplied with the unit of a physical quantity" the zero-quantity (for the physical quantity).

Notice that this is not just theory. Applying +5 F and -5 F in a point, has exactly the same effect as applying no force in this point at all.

In the examples above we could replace F by apples or elephants. Unfortunately (to give an example from our daily life) there exists no -2 apples or -2 elephants in our world. But in principle, with a little good will, we can imagine that there exist an elephant in a special kind of antimatter so that 2 elephants in antimatter completely neutralize 2 elephants in matter.

The only thing that is important to understand and remind from the example of apples or elephants, is that 5 F or 5 elephants are essentially quantities, and no coordinates or something like that.

(1) Because it are quantities, it is obvious that the absence of F or elephants is the same as 0 F or 0 elephants.

(2) That the absence of something exists is obvious. There are enough places to find where there are (exist) no elephants (= 0 elephants).

From (1) and (2) follows that 0 F or 0 elephants exist.

Let's continue with the example of the forces.
If 0 F exists then an infinite number of other representations (ex. 5 F – 5 F) that are completely equivalent with 0 F also exist.

Notice that 5 F in the example above does not exist on itself. It is indeed 5 F – 5 F that exist.

The reasoning that is made for forces, can be made in precisely the same way for other physical quantities in our universe. (electric field, position in space, …) The only condition is that for each value of a physical quantity there should be an additive inverse value of a physical quantity, so that the sum of both equals the zero-quantity. In the following text, only this kind of physical quantities will be considered.

To make the picture complete of all that exists (even what is no part of our universe), the following reasoning can be made.
In order that values of a physical quantity exist, two conditions should be fulfilled.
1. The values of a physical quantity should be possible.
Something "is possible" is precisely the same as saying that "something is not impossible". So, if there exists no reason that excludes a value of a physical quantity, then the value of the physical quantity is possible.
2. There should be a reason so that possible values of a physical quantity effectively exist.
The zero-quantity (= 0 multiplied with the unit of a physical quantity) exists for each physical quantity. Therefore (as shown in the beginning of part 1) all combinations, of possible values of physical quantities (ex. 2 F; -7,31 F), for which the sum equals the (existing) zero-quantity also exist. It is obvious that when A = B, and A exists, that B of course also exists.

<u>Conclusion</u>
In this part is explained that from a collection of possible (= no reason to exclude) values of a physical quantity, all combinations wherefore the sum equals the existing zero-quantity also exist.
In other words, all possible ways to represent an existing zero-quantity of course also exist.

<u>Part 2: Why does nature's laws exist?</u>
The simple rule that the sum of the values of a physical quantity (that are possible) should equal the zero-quantity, is of course not sufficient to explain complex laws in our universe.

Although …

As long as one physical quantity is considered, or multiple physical quantities are considered that exist on itself, completely unconnected from each other (ex. time and position on an X-axis), then there are no physical laws possible as in our universe.

The situation changes completely when multiple physical quantities are considered that are somehow connected with each other. We will call physical quantities that are connected with a relation to each other from now on “bound physical quantities”.

Example 1:
Consider following bound physical quantities:
. x: Position on an X-axis. (m) ; (we will call this from now on “position”)
. t: Time (s)
. v = dx/dt: Speed (m/s)

Notice that speed, because of its definition (dx/dt) can only exist when also position and time exist. So, because of the introduction of the physical quantity speed, the two other physical quantities (position and time) automatically also exist, and because of the definition of speed (dx/dt) the three physical quantities are even linked to each other by the following relation:

dx = v . dt ; (“.” point stands for the multiplication)

For each of these physical quantities we can define a physical unit:
. Ex: unit of length (1 m)
. Et: unit of time (1 s)
. Ev: unit of speed (1 m/s)

We will call a collection of linear independent physical units from now on a “basis”.
Elements that can be expressed as a linear combination of the 3 physical units will be noted as follows: (x, t, v)
This element corresponds with respectively the 3 following values for the 3 physical quantities:
x . Ex , t . Et , v . Ev

Consider now for each physical quantity of the basis, the value that corresponds with the zero-quantity. This is an element, that we call the zero-element for the basis.
In this example the zero-element is (0, 0, 0).

Universe
Consider a basis, consisting of physical units, for a collection of bound physical quantities.
We will call a universe, a collection of elements, where each of these elements can be expressed as a linear combination of the physical units from the considered basis. Thereby the elements of the collection should be possible, and the sum of the elements must equal the zero-element.

Thereby the following is already shown:

. That complex nature's laws exist because the physical quantities are bound.
. That the zero-element is an element that effectively exists.
. That elements that are possible (no reason that excludes the existence of these elements), effectively exist on the condition that the sum of these elements equals the (existing) zero-element.

(for a concrete development of a mini universe, see example 2)

Remarks:

1. Our universe, of course, also obeys the definition of a universe given above.

2. In our universe we see that everything is connected with everything through nature's laws. This is precisely what we expect when the elements of a universe are a linear combination of a collection of bound physical units.

3. The here proposed universe explains well the singularity (big bang theory) from which our universe originates. This is the zero-element (of course t = 0 s) in the given explanation.

4. Scientists agree that space itself expands, starting from the big bang. This is also what we expect, based on the explanation in this text. The zero-element corresponds of course with t = 0 s. When we assume that on that moment there are no other elements with t = 0 s part of our universe (= collection of elements), then there also doesn't exist any space at that time. Space starts existing after (and maybe before) t = 0 s.

5. The given explanation allows the existence of all kind of stable particles. Those particles have a wave character precisely as we see in our universe.

6. The given explanation leads to a good understanding of time and time perception. A given physical quantity dx/dt implies that for each element (x, t) also the following element (x + dx, t + dt) exists. If only (x, t) exists, then dx/dt would be a meaningless concept.
   Because of the existence of this kind of physical quantities (d…/dt), in each element the link with the next element in time is made. By this mechanism we get the sense of time perception.

7. There are lots of alternative reasoning's (using complete different starting points) that leads to the same conclusions as given in this text. Besides this, it can be proved that the explanation in this text is the only possible explanation for the existence of our universe! So, it is not just the first explanation for our universe, it is also the only explanation for the existence of our universe.

8. What is described in this text can perfectly be described using the theory of vector spaces. For the basis vectors of a vector space, we just have to choose "physical units, for a collection of bound physical quantities". Some basic ideas that are explained in this text, are almost literally what is stated in the definition of vector spaces.
   Example: "There exists an element $0 \in V$ (Vector space), called the zero vector, such that $v + 0 = v$ for all $v \in V$"
   http://en.wikipedia.org/wiki/Vector_space

There is not written, "… sometimes exists …" or "… the zero vector not really exists …".
Until now no one questionings the theory of vector spaces.

Each of the remarks above can be worked out further, but it is not the purpose of this text, to write a whole book with a lot of mathematics. When someone is interested, then each of the statements above can be discussed in further detail.

To make it all a bit more concrete, an example of a mini universe is given.

Example 2

Here we will consider a mini universe, where electric fields exist, and where particles (charged or not) in an arbitrary electric field move precisely like in our universe.
To avoid that everything should be written in 3 spatial dimensions, only one spatial dimension is considered.

Electric field, acceleration and speed are physical quantities that are by definition the following expressions:

. $E = F/q = m.a/q = m/q \; . \; a = c \; . \; a$; (with $c = m/q$)

. $a = dv/dt$

. $v = dx/dt$

With:

. E: electric field (N/C)

. F: force (N)

. a: acceleration (m/s^2)

. v: speed (m/s)

. x: position on an x-axis (m)

. q: charge (C) ; (C: Coulomb)

. m: mass (kg)

. c = m/q (kg/C)

It is perfectly possible to work out the example without using the c physical quantity. In that case we have to work with mass m and charge q, what leads to a little bit more text. But the main reason that we use the c physical quantity is that it must always be the purpose to explain everything in a universe with a minimum of physical quantities.

Notice the following:

1. Values of the physical quantities above are possible.
When the laws resulting from the definition of the physical quantities are respected (see further calculations), then there are no reasons that exclude the existence of values for the physical quantities above.

2. The sum of the elements of the universe should equal the existing zero-element.
As shown before, is this the reason why a universe exists.

To make it easy we will consider a particle with the size of a point (=element). A moving particle then corresponds with a collection of elements with $c \neq 0$ kg/C. The "space" outside the particle

corresponds with elements with c = 0 kg/C. To get a movement that is identical to the movement of an electron in an electric field in our universe we choose for
c = mass electron / charge electron
= 9,109534×10^{-31}kg / 1,6022×10^{-19}C
= 5,69×10^{-12}kg/C

Consider now a basis B that is a collection of bound physical units:
(EE, Ea, Ev, Ex, Et, Ec)
These are the physical units for respectively the following physical quantities E, a, v, x, t, c.

The universe that we will consider is a collection of elements that can be written as linear combination of the physical units from basis B.

When we now consider an arbitrary electric field in this universe, then a particle (c ≠ 0 kg/C) in this field will move precisely as a particle in our own universe. We will choose for this example a relative simple electric field.

We define the elements of the universe (yet without the particle) as follows:
. E = (15 - x) / 10^6 N/C ; x ∈ [10, 20] ; the electric field
= 0 N/C ; x ∈ { [-xmax, xmax] \ [10, 20] } ; outside the electric field
. a = 0 m/s²
. v = 0 m/s
. x ∈ [-xmax, xmax]
. t ∈ [-tmax, tmax]
. c = 0 kg/C
Notice that the sum of the elements in this universe is the zero-element. This is the condition so that the universe can exist.

We consider now a particle in the universe with the following characteristics on time = 0 s.
. t0 = 0 s
. v0 = 1258 m/s
. x0 = 15 m
. c0 = 5,69×10^{-12}kg/C
Based on the definitions, we can find the values of the other physical quantities.
. E0 = (15 - 15) / 10^6 = 0 N/C
. a0 = E/c = 0 / 5,69×10^{-12} = 0 m/s²
By definition, a physical quantity c (≠ 0 kg/C) in an electric field results in an acceleration. But by definition, acceleration and speed only make sense when more than one element exists.
. v0 = dx/dt can only exists when 2 elements with respectively x0 and x0 + dx = x0 + v0 . dt exists.
. a0 = dv/dt can only exists when 2 elements with respectively v0 and v0 + dv = v0 + a0 . dt exists.
We can apply the same logic on the second element, and by this way get a third element. Etc…
All conditions, because of the definitions of the physical quantities, can be translated to an equation.
The solution of this equation is the collection of elements that fully describes the particle.
The acceleration of the particle is given by following equation.

$d^2x/dt^2 = a$

$= E/c$

$= (15-x)/(10^6 . 5{,}69\times10^{-12})$

$= 175747\ (15-x)$

This is a differential equation for which we give immediately the solution:

. $x = 15 + 3 \sin(419{,}22\ t)$ m

. $v = dx/dt = 1258 \cos(419{,}22\ t)$ m/s

. $a = dv/dt = -527378 \sin(419{,}22\ t)$ m/s²

The path of the particle has the following general features:

. The particle makes an harmonic oscillation motion comparable with the movement of a mass in a one dimensional mass-spring system without damping.

. Frequency = 419,22 /2pi = 66,72 /s

. Period: T = 0,015 s

. Middle point of the movement: x = 15 m

. Amplitude of the movement: 3 m

The particle is therefore completely described by the following collection of elements:

. $E = (15 - x) / 10^6$ N/C

. $a = -527378 \sin(419{,}22\ t)$ m/s²

. $v = 1258 \cos(419{,}22\ t)$ m/s

. $x = 15 + 3 \sin(419{,}22\ t)$ m

. $t \in [t1, t2]$ s

. $c = 5{,}69\times10^{-12}$ kg/C

Notice that these elements take the place of elements in the original situation (without particle) corresponding with:

. $x = 15 + 3 \sin(419{,}22\ t)$ m

. $t \in [t1, t2]$ s

The elements that correspond herewith occur thus only once (not twice) in the collection of the universe.

In order that the universe with the moving particle can exist, the sum of the elements in this universe should equal the zero-element. We will check this per physical quantity:

. E: was initially OK (sum = 0 N/C), and the particle changes nothing to this.

. a: as long as multiples of full periods ($t2 – t1 = k . 2pi/419{,}22$ s with k an integer) are considered is this OK (sum = 0 m/s²), and is there nothing that should be compensated. It doesn't matter where the period starts.

. v: as long as multiples of full periods are considered is this OK (sum = 0 m/s), and is there nothing that should be compensated. It doesn't matter where the period starts.

. x: was initially OK (sum = 0 m), and the particle changes nothing to this.

. t: was initially OK (sum = 0 s), and the particle changes nothing to this.

. c: here is a problem. This should be compensated in one way or another, so that the universe can exist. One of the many solutions to compensate this, is that a second particle is introduced that exists

as long as the first particle, and wherefore the charge is opposite (c = -5,69×10^{-12}kg/C). The introduction of multiple particles, with different c values, that exist longer or shorter is of course also possible. The place of the particles doesn't matter, as long as they are within the space and time of the universe from this example. In other words, for the new (compensating) particle there are no new elements created. There are only some physical quantities of elements that are changed compared with the universe with one particle.

We will work out the example by choosing a second compensating particle that exists as long as the first particle, and wherefore the charge is opposite (c = -5,69×10^{-12}kg/C). This leads to the following modifications compared with the universe with one particle.

We start with considering an extra electric field:
. E = (x - 100) / 10^6 N/C ; x ∈ [80, 120]
The position and the size of the field doesn't matter, as long as the sum = 0 N/C.
Notice that this electric field is opposite to the field where the first particle moved in. (here is written +x instead of –x in the equation of E) This is necessary, to get an acceleration in the right direction. The c value of the particle will be opposite compared with the first particle, therefore the field must also be opposite.

The second particle is completely described by following collection of elements:
. E = (x - 100) / 10^6 N/C
. a = 527378 sin(419,22 t) m/s²
. v = -1258 cos(419,22 t) m/s
. x = 100 - 3 sin(419,22 t) m
. t ∈ [t3, t4] s ; t4 – t3 = t2 – t1
. c = -5,69×10^{-12}kg/C

In general there are lots of compensation mechanisms possible, so that the sum of the elements of a universe equals the zero-element.
Here are some possible compensation mechanisms:
. Particles with opposite charge. Ex. Electron <-> proton.
. In general people considers a particle, and a separate field around. It is also possible to see both as one field (values of a physical quantity ≠ zero-quantity), so that the elements intern (the particle itself) compensate (completely or partly) for the external elements (field around the particle). A particle can of course be built up out of multiple fields (values of different physical quantities ≠ zero-quantity), comparable with an electro-magnetic wave, that is built up of an electric and magnetic field.
. Wave motion, like an electric field that becomes alternating positive and negative.
. Particles that turn around each other. => In case there are multiples of complete periods considered, the resultant of the speed and the acceleration of the particles both equal the zero-quantity.
. The existence of a dual universe. With this principle, an apparent imbalance in one part of the universe can be compensated by the opposite imbalance in the other part of the universe. Example: Matter in one part of the universe, and antimatter in the other part.

A dual universe means that the two parts doesn't exist in the same space. The most obvious is that the separation happens by the physical quantity time. In one part is $t > 0$ s, while in the other part $t < 0$ s. The singularity or zero-element ($t = 0$ s) is the only connection between the two parts of the universe.

. A multiversum can also be an explanation for the existence of apparent imbalances (sum ≠ zero-element)

. …

To let this example better match with what actually happens in our universe, some additions should be done.

. In our universe are 3 spatial dimensions (=3 physical quantities) instead of one like in the example.

. Other physical quantities (ex. for magnetism) need to be added to the example.

. Particles that are stable need to be created. There should be fields around it, that correspond with the fields of particles in our universe.
Ex. an electric field will not be proportional with the distance ($E = k \cdot x$; like in the simple example above) Instead an electric field outside a particle will be proportional to $1/(\text{distance to particle})^2$.

…

<u>Conclusion of example 2</u>

Operate in a basis of bound physical units gives precisely the same result as the classic formulas from physics. However, classic physics do not explain why these formulas (nature's laws) exist, while here is shown that there is no other way than that they exist in the here considered basis.

<u>General conclusion</u>

When we just write down which things inevitable exists, then this leads almost immediately to the conclusion that all kind of universes should exist. This is precisely what we expect when using some common sense: our universe exists, and it is obvious that there should be a good reason for this. When we agree to watch our universe in this new manner, then this will result in a tsunami of new insights in how our universe works. These insights will remain unreachable when we ignore new techniques and stick to a narrow minded vision on physics.