The evolution of the universe.

I use a model for the evolution of the universe that starts with a big bang of a sphere filled with vacuum energy. This is relatively easy to calculate on.
This vacuum energy sphere is embedded in an empty space (which is really empty) and is basically infinite. In contrast to the current view in science, it is not the space that expands but the vacuum energy sphere! This mistake is understandable because in Einstein's time people had no idea of the existence of vacuum energy, and so space expanded. That however created a huge problem of what would be beyond the edge of the universe? Anyway that problem no longer exists in my model.
The Friedman equation describes the expansion of densities (vacuum energy density and matter energy density), not that of empty space. The constant energy density introduced later (the cosmological constant, which caused the creation of free vacuum energy, rightfully a perpetuum mobile) has no right to exist in my model and can be forgotten.
Inside the sphere the radial expansion speed is depended on $v = H.r$, but one has to realize that H is a function of time and everywhere in the sphere the same vacuum energy density prevails (thermal equilibrium, no heat can be exchanged with the empty space outside the vacuum energy sphere).
The difficulties begin as soon as matter can be formed when the expansion speed falls below the speed of light.
As soon as that limit is passed, the particles that move at the speed of light can be produced directly from the vacuum energy. There will be a 'flash' all over the contents of the sphere.
These are: photons, gravitons and gluons. From that moment on, the other matter particles can be formed (visible and dark matter).
Gradually almost every very small vacuum energy volume element dV will be converted into matter. This happens with the passage of time and the constant expansion (vacuum energy sphere is getting larger).
The created matter will eventually form a noticeable 'brake' on the vacuum energy expansion.
However, the vacuum energy expansion does take the formed matter along with its expansion, since the converted vacuum energy volume element has a radial expansion speed, which is given to the formed matter.
The local group of galaxies, of which our solar system is a part, therefore moves radially with the vacuum energy expansion. This would then be the residual speed that remains when measuring the 3K cosmic background radiation, after correction of all speeds to which the earth is subject, and is approximately equal to 600 km/sec. Opposite to that direction, one should therefore look into the direction of the big bang.
As soon as a noticeable amount of matter has been formed, the vacuum energy expansion will decrease. An additional delay of the expansion speed will occur. This is then measured from the centre of the vacuum energy sphere.
However, humans are on the earth and certainly not at or near the edge of the universe. After all, we see matter around us in all directions.
An observer on earth then sees this extra delay as an acceleration! The observed accelerated expansion of the universe is therefore proof of the continuous conversion of vacuum energy into matter!
Because the observed universe is already at least 13 billion years old (these are the oldest stars), a significant part of the vacuum energy has already been converted to matter (about 31%) and 69% vacuum energy remains. So there is still expansion of the vacuum energy sphere. Only after reaching the approximately 50% limit can there be a contraction.
So there is a preferred direction in the universe, namely to the centre of the big bang sphere .
This radial direction therefore determines the direction of expansion and later the contraction direction of the sphere in which we live.

As soon as the expansion speed has fallen below the speed of light, matter can be formed anywhere in the sphere from the vacuum energy. In the first instance, this will be visible matter because, due to the high expansion speed, particles can be formed that are high in energy. These are then the particles that contain charge (electrical and / or colour), the high-energy particles. The particles with charge I call visible matter.
I call the particles without charge (relatively low energy particles, in terms of rest-mass) dark matter. Of these, we know 3 so far: the 3 different neutrinos.
With this reasoning, I can immediately solve the mystery of the only left spinning electron-neutrinos.
Let me start with the charge-less electron, so a particle without an electrical charge. It is called an electron-neutrino. This electron-neutrino therefore only has rest-mass and can turn left or right (spin). The only difference between the two spinning electron-neutrino particles is therefore spin to the left or spin to the right. The anti-clockwise electron-neutrino is called the regular particle and the clockwise particle the 'anti-particle'.
If nature now adds electrical charge to the electron-neutrino (this can be + or -) then the only difference between particle and anti-particle is the difference in charge. Both charged particles can rotate left or right. The electron neutrino with a negative charge is then called the electron and the electron-neutrino with a positive charge is then called the positron.

Now that the charged electron-neutrinos can be both positively and negatively electrically charged, the collision between the two oppositely charged particles produce an interesting phenomenon:
Annihilation of both particles and the creation of 2 oppositely moving gamma photons. The annihilation is only possible because the electrical force is so much greater than the gravitational force.
Neutrino and anti-neutrino will therefore not change to other particles in the event of a collision! This is supported by the large percentage of dark matter compared to visible matter.
The collision can be seen as a mini-big bang, whereby the 2 charged particles merge into a vacuum energy sphere that in turn expands (initial speed $\sqrt{3} * c$) and, when breaking the speed of light barrier downwards, merges into 2 gamma photons.
With this process, the conservation laws, as we know them apply: conservation of energy, momentum and angular momentum.
What happens now if an electron and a positron annihilates? This is based on the following model of an elementary particle: a hollow ball, just like a Bucky ball (C_{60}).
I came up with this model because I calculated the angular momentum of a Bucky ball and ended up with ½ħ (the spin value of an electron) !!
A hollow sphere can remain hollow or collapse due to an external force (f.i. a collision). It can be imagined that when a hollow elementary sphere collapses, it starts with a speed of zero (resting state) and that speed can increase until the speed of light. When the speed of light threatens to be reached (mass becomes infinite), it cannot collapse any further (after all, there is a finite mass, see the paragraphs on the Plank speed at the end of this story) and converts the sphere (or 2 spheres together)) to a vacuum energy sphere and it starts to expand at a speed of $\sqrt{3} * c$, after which it dissolves into 2 oppositely-oriented gamma photons when the speed of light is reached.
Only because 2 oppositely electrically charged elementary particles attract each other with an enormous force and collide with sufficient speed, they can break the hollow sphere shape and thus cause a mini big bang.
This model also explains why a black hole does not 'explode' into a big bang. The gravity is not strong enough to break the hollow spheres! What remains is a sphere with the Schwarzschild radius where the hollow spheres are neatly packed together and the sphere rotates as a whole. See my big bang model on the website. A black hole is therefore absolutely no singularity.

That of course immediately raises the question, when will you get a 'big' big bang? In principle, roughly when the gravitational force in total becomes just as great as the electrical force in the annihilation of electron and positron. This amounts to a black hole of at least approximately $4.36 * 10^{43}$ kg!

$F_{el} = f \cdot \frac{q \cdot Q}{r^2}$ en $F_g = G \cdot \frac{m \cdot M}{r^2}$ Calculate the ratio F_{el} / F_G with q,Q the charge of the elektron,positron and m,M the mass of the elektron,positron

This means that a big bang must have a mass of at least $4.36 * 10^{43}$ kg or more, in the form of a vacuum energy sphere. The radius of this minimum big bang sphere can be calculated with the model I give on this website:
Radius of the mass-sphere prior to the final contraction (Schwarzschild radius); contraction velocity is zero:

$m/r = c^2/2G$ ➔ $r = (2G/c^2).m$

Radius vacuum energy sphere, after reaching the speed of light (see again the story about the Planck speed at the end):

$m/r = c^2/G$ ➔ $r = (G/c^2).m$ ➔ $r_0 \approx 6{,}67.10^{-11}/(9.10^{16})*4{,}36.10^{43} \approx 3{,}23.10^{16}$ (mtr) ≈ 3,41 lightyears.

It is seen that after the contraction and conversion to vacuum energy, the radius of the vacuum energy sphere is half that of the mass sphere. The radius of the vacuum energy sphere is about 3.41 light years, far away from the current assumption that the universe originated from a sphere the size of an orange (after Ralph Weijers in a video presentation about the big bang).

A proton and an anti-proton can also annihilate, but this is no longer an elementary particle and there is a waterfall of different elementary particles (no mini bang).

A mass sphere with a mass smaller than $4.36 * 10^{43}$ kg will not convert to a vacuum energy sphere. However, there will still be some vacuum energy between the stacked spheres, since there is still the space filled with vacuum energy, but with a very low density.

Professor Achterberg's cosmology book estimates the mass of our universe at around 10^{52} kg, well above the 10^{43} kg limit.

<u>Then something about matter formation:</u>
Each vacuum energy volume dV has a radial velocity. All known conservation laws apply in principle: conservation of energy, conservation of momentum and finally conservation of angular momentum. To comply with all three of these conservation laws, particle formation will occur in pairs. This is mainly caused by angular momentum: for the volume dV it is equal to zero, and in order to keep it that way, the pair of created particles will have one turning counter-clockwise and the other one clockwise, together an angular momentum of zero.
The particles created, have a combined radial direction of movement (momentum conservation), which can change as soon as they interact/collide with other particles of matter.
The moment matter is created everywhere in the sphere, a gravitational force will immediately start working opposite to the vacuum energy and directed towards the centre of the sphere.
Vacuum energy is, as it were, exchanged for gravitational matter, which immediately reduces the expansion.

Now that matter creation is going to take place everywhere in the sphere, eventually the EM radiation of the 3K cosmic background radiation can also be formed. When the universe became transparent, the radiation temperature was much higher and is now finally cooled to a value of about 3K due to the expansion of the vacuum energy sphere.
This should be seen as follows: because the EM wave propagates in the vacuum energy space (in a really empty space the wave cannot propagate!) And is therefore part of the vacuum, the wavelength of the EM wave is also subject to the expansion and will therefore stretch. This is seen as a red shift of the cosmic background radiation. Meanwhile, the red shift has progressed so far that it has a temperature of 3 K. This also means that this cosmic background radiation has lost energy, since the wavelength has become larger and therefore the energy per photon smaller. So energy has actually been returned to the vacuum. Fortunately, this amount of energy gain for the vacuum energy is not as large as the loss due to matter formation.
The universe does not continue to expand forever.

So far I have not talked about quantum mechanics. This theory does not come into play at all in this theory, except for matter formation but not in the current form of E = h.f but in the form p.c = h.f where p is the momentum and f is the frequency of the generated wave by the rest-mass particle as it starts to move. With rest -mass particle I mean those particles that are still capable of generating an interference pattern in the 2-slit experiment. The largest particles that still succeed in generating the interference pattern are the larger spherical molecules, such as a Bucky ball.

Then I need to theorize about the Planck length. This appears in the formula for the speed of light:

$c^3 = (G.h)/(l_{pl})^2$ (1) . There is also the formula: $c^2 = (\varepsilon_0.\mu_0)^{-1}$ (2)

The Planck length is therefore one of the 4 fundamental variables that determine the speed of light in these 2 formulas. It applies to both EM waves, Gluon waves, Graviton waves and deBroglie waves.

By combining these 2 formulas for the speed of light, of the 4 quantities, only 3 are independent:

$c^6 = (G.h)^2/(l_{pl})^4 = (\varepsilon_0.\mu_0)^{-3}$ ➔ $(l_{pl})^4 = (G.h)^2.(\varepsilon_0.\mu_0)^3$

The Planck length therefore relates to all 4 known waves that move with the speed of light in the vacuum energy space.
The energy of those waves is known and equal to $E = h.f = h.c/\lambda$ and the momentum is equal to $p = h/\lambda$.
In these formulas there is only one unit of length and that is the wavelength of the wave.
From that I draw the conclusion that the Planck length is related to a wavelength and that wavelength that is then the smallest possible for a vacuum energy wave and there is therefore a maximum to the energy of a vacuum energy wave:
the Planck energy and from there a Planck frequency.
The following applies: $c = f.\lambda$ and it follows for the Planck energy: $E_{pl} = h.f_{pl} = h.c/\lambda_{pl} = (h.c^5/G)^{½}$

For a photon, for example, the maximum energy of a γ-photon is equal to the Planck energy. This is actually an expression of the physical fact that the reciprocating movement of a wave's vibration can only be accomplished to a certain frequency, the Planck frequency.
In the Planck time, the wave travels exactly one wavelength with the speed of light.
Now that there is a maximum energy for a vacuum energy wave, this also has a consequence for a deBroglie wave. This wave is generated in the vacuum energy space as soon as a rest mass particle starts to move relative to the coordinate system. A deBroglie wave also moves with the speed of light and so the energy of that wave is maximum equal to the Planck energy.

This means a maximum speed for a rest-mass particle! The energy of the wave is, after all, directly linked to the momentum via the formula: $p.c = h.f = E_{pl}$.
Elaboration provides the following formula for the maximum speed of a resting mass particle:

$(v_{max})^2 = c^2.(m_0.G/(h.c) +1)^{-1}$

The fraction $m_0.G/(h.c)$ therefore determines how much the maximum speed remains below the speed of light c.
$h.c \approx 2.10^{-25}$ and for an electron $m_0.G \approx 6.10^{-41}$ and so the maximum speed is ≈ c.
This formula therefore applies to a deBroglie wave with the Planck energy generated by an elementary particle that moves with a maximum speed v_{max}, the Planck speed.
The energy of the rest-mass particle is then:
$E = m.c^2 = m_0.c.(c^2 - (v_{max})^2)^{-½}$

The significance lies primarily in the fact that if the contraction speed reaches the speed of light, the mass would become infinite for every elementary rest-mass particle. That does not happen. That is also impossible because the big bang has started with a finite amount of energy.

This also means that in the final phase of the cycle of universe, the contraction speed is close to c, but never exactly c, it is prevented because there is a maximum speed for each elementary particle (Planck speed) which interacts through the coupling of the momentum with the deBroglie wave.
I think it can be said that once the maximum velocity of each elementary particle is reached in the final phase of the contraction, the transition takes place to the particles moving at the speed of light, so that the final speed of the contraction can indeed become the speed of light and a new big bang is coming. So:
1) Electrically charged particles transfer to photons.
2) Quarks transfer to gluons and photons.
3) Particles without charge (dark matter) transfers into gravitons.

A small amount of dark energy then remains in which the plasma of photons, gluons and gravitons move, and as soon as the contraction speed reaches the speed of light a new big bang takes place, since the space in which the remaining particles move with the speed of light is constrained. The contraction is locked in and a new big bang takes place.

We are currently on a conversion of 69% vacuum energy and 31% matter. So there is still quite a bit of vacuum energy to convert. <u>The proof of this is the observation of the accelerated expansion of the universe.</u>
Once more than 50% of the conversion has taken place, a reversal will follow and the expansion will turn into a contraction. The redshift of the 3 K background radiation will gradually switch to a blue shift: the temperature of the radiation will increase. Because there is now a contraction, visible matter can also be formed at a given moment as soon as the contraction speed has become large enough.
With a further increase in the contraction speed, the contraction will result in a new big bang according to the above scenario.