Today's quantum mechanics revolves around a postulate (E_{totaal} = h.f), while the AR is a derived theory, based on the phenomenon that the vacuum wave velocity (including the speed of the photon, the speed of the graviton, the speed of a gluon) is the same for all observers, regardless of their reference system, is constant and is equal to the value c.
This is an experimentally determined fact. Apparently, the vacuum wave velocity has a different propagation mechanism than a rest mass particle that has no constant velocity but can never move faster than c.
The postulate of contemporary quantum mechanics has not been established experimentally and states that the energy of a rest mass particle is equal to: E_{totaal} = h.f , where f is the frequency of a 'de Broglie wave'. The particle is thus considered a wave.
The AR van Einstein does not do that. That says that the energy of a resting mass particle is equal to:

$E = m.c^2$, which can also be written as: $E^2 = (m_0.c^2)^2 + (p.c)^2$ (1), in which p is the absolute value of the momentum vector.

That there is a wave character of rest mass particles is clear. That appears from various experiments and, for example, the electron microscope. If we look at formula 1 it is clear that the first term does not have a wave character, but the second term can be, after all, p is a vector. In doing so, I recall that a wave also has a vector character. It is therefore obvious to associate the term p.c with a wave. This is no different than with the following interpretation:
If a resting mass particle is stationary, there is no question of a wave, after all the momentum is zero. As soon as the particle starts to move on the basis of an interaction, a wave is generated and this is called a 'de Broglie wave'. The wave that is generated cannot be anything other than a vacuum wave and thus moves with the speed of light.
The fact that every vacuum wave moves with the speed of light follows from the requirement that there must be one unambiguous physics theory.
This then relates to the Lorentz transformations. From a historical point of view they are derived with the aid of a light source (photon), but it could just as easily be done with a gravitational source (graviton), a gluon source or a 'de Broglie source'.
The rest mass particle then follows the path that prepares the path of the wave for him . For example, charge can polarize the vacuum, causing the path of the wave to change and thus the path of the rest mass particle, just like gravity, also changes the vacuum (space).
The generated 'de Broglie wave' thus moves with the speed of light, for which a phase velocity of $c = f.\lambda$ (2) applies. Max Planck has learned that the energy of a vacuum wave is equal to E = h.f
So we have: E = h.f = p.c (a vacuum wave has no rest mass) and with formula 2 one gets:
$p = h/\lambda$ (3)

Today's quantum mechanics says it differently. The whole particle is a wave for which applies (I use formula 1):

$E^2 = (m_0.c^2)^2 + (p.c)^2 = (h.f)^2$

In order to be able to continue using Formula 1 (from the AR), the particle must have a phase velocity of c^2/v. The rest mass particle itself then moves over the carrier wave at a velocity v (the group velocity, the part of the carrier that has a substantial amplitude).
Note that here one talks about a phase velocity much larger than c. Strangely enough increases the phase velocity as the particle moves more slowly. Everyone knows that a rest mass particle cannot move faster than c, but here you can! For where on the carrier wave does the rest mass stop so that

the carrier wave can move faster than the vacuum wave speed? It gets even weirder because 'the group' represents the rest mass on the carrier wave. The only difference is that 'the group' has a noticeable amplitude and the rest of the carrier wave has a minimal amplitude. So basically the whole carrier is mass and therefore can not move faster than c !! Today's quantum mechanics neglects that for the sake of convenience.
If the particle is stationary you get the strange formula: (momentum is zero)

$E = h.f_0 = m_0.c^2$ It says: to the left of the 'equal' sign there is a wave with frequency f_0 , on the right there is a mass that can not move faster then the speed of light and has a velocity of zero.
The wave f_0 moves at an infinite speed, after all v = 0 !
Is this physical reality ??

This also means that if the rest mass particle is stationary, the wavelength of the particle will go to infinity. So when the rest mass particle is standing still it has an infinite length. We all know that this cannot be true because just as the AR applies to both large and small objects, this must also apply to quantum mechanics. Everyone knows that if you are standing still, that you will not suddenly become infinitely long. But ... it is all possible in contemporary quantum mechanics.
Because a particle is considered a wave, one also derives from it the uncertainty relations of Heisenberg. That has had all kinds of consequences in all kinds of theory calculations.
It has even become so bad that an experiment like entanglement is completely misinterpreted and the evidence is overlooked that contemporary quantum mechanics is based on a wrong postulate. To explain the experiment of entanglement is even thought of a transfer of information with an infinite speed, without wondering how on earth, one particle knows where the other particle is located and how it can recognize that particle.
To 'prove' contemporary quantum mechanics, the experiment of Alain Aspect is cited, but that experiment only works with photons and not with rest mass particles. It is indeed true that for a photon applies E = h.f , therefore it is to be expected. Jubilation , but with rest mass particles it does not succeed, people speak about various "loopholes" just to explain why it does not work (it could possibly succeed with relativistic rest mass particles because for these particles does apply $E \approx pc = h.f$, as the rest mass is negligible).

Quantum mechanics can be fitted in with the AR if one states:

p.c = h.f and a 'de Broglie wave' is regarded as a vacuum wave (with a phase velocity of c) that is generated in the vacuum as soon as a rest mass particle starts to move relative to the measuring frame. The rest mass particle is then not a point but has a 3D dimension, natural shape , a sphere. All vacuum waves then move at a speed c and the Lorentz transformations can then be correctly derived for all sources of vacuum waves. The vacuum wave speed is then the connection between the various interactions such as gravitation, electromagnetism, strong and weak force.
According to Maxwell, for the speed of the photon applies the following formula:

Photon: $c^2_{foton} = 1/(\varepsilon_0.\mu_0)$ (4)

Graviton and "de Broglie": $c^3_{graviton} = h.G/(l_p)^2$ (5) where l_p is the Planck length.

I notice that according to Maxwell's theory, the speed of the photon is equal to formula 4. The gravitational theory provides a formula for the Graviton or 'de Broglie wave' according to formula

5. Both expressions for the vacuum wave velocity are derived according to the laws of the respective interaction that applies.
All particles (waves) without rest mass move with the vacuum wave speed (also: the speed of light). Rest mass particles generate gravitation - and "de Broglie 'waves; if there is also a charge, then other vacuum waves can also occur, such as photons and gluons.

This paper also brings the interpretation of the Planck length. What exactly is that? I read all sorts of interpretations in the professional literature.
I therefore also make an attempt. The vacuum wave velocity is determined by the properties of the vacuum to which the interaction relates.
In any case, all resting mass free particles have an energy of E = h.f
As far as the properties of the vacuum are concerned, the Planck constant is related to the energy of the wave. One should therefore use Planck's constant and not that of Dirac..
In my view, therefore, with regard to the gravitation and 'de Broglie' waves , the Planck length can be nothing more than a wavelength and / or the minimum wavelength that a wave can have that can occur physically. That automatically means a maximum frequency (physically a vibration can still exist) and thus also a maximum energy for a vacuum wave. This energy can be calculated.
There is:

$E = h.f$ and $c = f.\lambda$ and $(l_p)^2 = h.G/c^3$. I now use the Planck length for λ.

$f^2 = c^2/\lambda^2 = c^5/(h.G)$ (the root from this gives the maximum possible frequency)

$E^2 = h^2.f^2 = h.c^5/G = (m_p)^2.c^4$ ➔ $E_p = m_p.c^2$

From this it follows that the Planck mass / energy is the maximum possible energy that a graviton and a ' de Broglie ' wave can have. It is derived from the speed for a gravitational wave, but could equally well apply to a photon and a gluon.

Because formula 4 and formula 5 c_{photon} and $c_{graviton}$ are equal to each other, the following also applies:

$c^6 = 1/(\varepsilon_0.\mu_0)^3 = h^2.G^2/(l_p)^4$ ➔ $(\varepsilon_0.\mu_0)^3 = (l_p)^4/(h^2.G^2)$ of: $(h.G)^2.(\varepsilon_0.\mu_0)^3 = (l_p)^4$

Of course, an object like a car weighs much heavier than a Planck mass. This means that a car generates several 'de Broglie' waves. The car has a limited density and the individual molecules / atoms then each have the possibility to generate a 'de Broglie' wave.
The Planck length does not necessarily have to do with the quantization of space. Quantization occurs with particles only when you lock them up in a box or in a bound system. Quantization then occurs because the generated 'de Broglie' waves become standing waves in the confinement.
In short: the distance travelled is a whole number of times the 'de Broglie' wavelength.
The space itself is not quantised. This also follows from the AR. Nothing in the AR implies a quantization of space.
However, in the AR there are certain conditions that have to do with the value of the speed of light: see my big bang article and website www.theorievanalles.nl .
If there is indeed a minimum wavelength for a 'de Broglie' wave, then it also means a maximum velocity for an elementary particle, as the momentum is limited. The following applies:
$p = h/\lambda$, with $p = m.v$ and $\lambda = l_p$, working out yields the following formula :

$(v_{max})^2 = c^2/(G.m_0^2/(h.c^3) +1) = c^2$, because the term $G.m_0^2/(h.c^3) << 1$ for elementary particles. This also applies to a Bucky ball (which also provides a nice interference pattern, and thus produces a single "de Broglie" wave. The current quantum mechanics does not explain why one molecule produces an interference pattern and the vast majority does not! That's weird because every particle is a wave!
Current quantum mechanics cannot explain why a charged particle-anti-particle pair annihilates and re-appears as a photon pair. I can, if the collision is considered to be a mini-big bang (first contraction and then conversion to vacuum energy , vacuum energy expansion, particle formation, according to my big bang model).

Especially the cosmological constant is something that is totally incorrect. Einstein was completely right to introduce it into an infinitely large material universe. But that turned out to be unstable and so it was abolished again.
But when it turned out that the universe was not static but expanding, it was again introduced as a constant for the energy density of the vacuum. Also again weird, because how can it be constant in a space that expands? Especially, as is now assumed, there was no matter in the beginning but only vacuum energy: the inflation period. At a certain temperature the first matter was then formed, from the vacuum energy. Meanwhile we are a lot further in time and from the total vacuum energy supply a total of 5 % visible matter formed (this process does not continue at this moment because the universe temperature is too low), 26 % dark matter and so there is still 69 % left of vacuum energy. One can therefore reasonably assume that the formation of dark matter still continues. Dark matter has no charge and so the rest mass of those particles is very low and therefore still dark matter can be formed.
Today's cosmology assumes, however, that with regard to matter distribution everything is fixed and no longer changes: 69% vacuum energy, 26% dark energy and 5% visible energy. One fails to find a solution with the existing models. Logical because the vacuum energy is not constant! The expansion of vacuum energy started with 100% vacuum energy with a corresponding mass via $E = m.c^2$.
The dilution law for this is proportional to r^{-3} . You can then use that in the Friedmann equation. See again my article about the Big Bang.
The fact that I am on the right track with my approach is evident from the fact that from the Friedmann equation with a requirement of a contraction speed of zero, exactly the Schwarzschild radius comes rolling out (equilibrium situation between internal pressure and contraction).

What are the consequences of my entire story? They are quite big. The entire basis of quantum mechanics is incorrect. Approximately for relativistic particles it is correct because then indeed $E_p = p.c = h.f$
But because a rest mass particle is not a wave , the Heisenberg uncertainty equations are invalid. After all, these are derived from the principle that a rest mass particle is a wave. Oddly enough, cosmology has always recognized this unconsciously (that a rest mass particle is not a wave)!
The cancellation of the Heisenberg relationships has really big consequences: there are no quantum fluctuations and Hawking radiation does not exist (is also never measured !!).
In the book by Professor Achterberg relativistic matter is recognized as being a wave ($E \approx pc$) and the dilution law thereby proportional to r^{-4} and non-relativistic matter is recognized as being no wave with a dilution law proportional to r^{-3}. If a matter particle was a wave then both relativistic and non-relativistic matter would obey a dilution law proportional to r^{-4} .
The entire quantum mechanics must then be rewritten starting from the equation: $E_p = h.f = p.c$

Because now a rest mass particle is not a wave, but produces a wave, the entire probability calculation to find a particle somewhere in space is also cancelled. The particle follows the path that the wave prepares for him. Thereby the path of the generated wave is affected by charge.