Conceptual FrameWorks
Research papers

On conceptual problems in cosmology

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Phenomenological reality is created by the underlying structure of the basis quantum fields and not the opposite. In cosmology this isn't the leading concept. Cosmologists share a different concept, the Standard cosmological model. Unfortunately, the general concept of quantum field theory doesn't predict the expansion of space and the concentration of all the energy of the universe in one little spot. The paper describes the consequences.

Introduction
The Standard cosmology model, the parametrization of the Big Bang cosmological model, is founded by the cosmological constant, cold Dark matter (CDM) and ordinary matter, like particles, planets, stars and galaxies. The model relies on Einstein's theory of general relativity, a phenomenological based model.

The Standard cosmological model is violating QFT but this statement is partly dubious because quantum field theory itself isn't a consistent theory because gravity isn't part of the theory. So if I want to show that the astronomical observations fit into the general concept of quantum field theory I have to explain some of the ΛCDM basics in terms of the underlying structure of the basic quantum fields.

Spacetime
Einstein's theory of general relativity is about phenomenological reality: the properties and mutual relations between the phenomena. The metric is obtained from the properties of phenomena and doesn't originate from an underlying conceptual model like quantum field theory.[1] However, the general concept of quantum field theory – the creation of phenomenological reality by an underlying structure – originates from the Greek philosopher Parmenides (~2500 BC).[2]

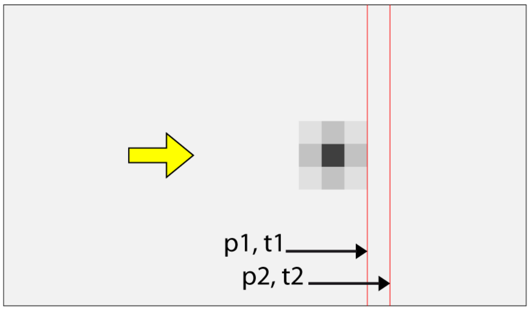

figure 1

In Einstein's theory of general relativity the properties of the phenomena are related to changes, observable changes that are described with the help of position in space and time. Figure 1 shows a rest mass carrying particle in space and its position changes from p1, t1 to p2, t2 *in relation to the observer*. The existence of the particle has created a local curvature of the spacetime continuum, related to the mass of the particle. Etc.

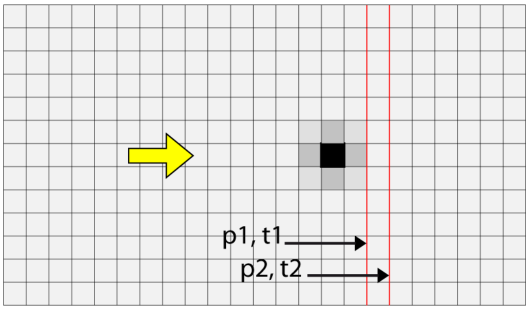

figure 2

Figure 2 shows the spatial structure of the basic quantum fields – quantized space – in a schematic way and the rest mass carrying particle represents the local magnitudes of the properties of a couple of spatial units. The transfer of the particle from p1, t1 to p2, t2 is the transfer of a local surplus of the average properties of the units *in relation to the creating structure of the basic quantum fields*. Properties we can describe in a mathematical way like we can describe the objects in the macrocosm. In other words, phenomena emerge from the underlying field structure.[1]

The theory of general relativity represents a simplified – reduced – model of reality. It is a model to facilitate phenomenological physics (the influence of neopositivism). The simplification of reality by phenomenological physics gives room for speculative cosmological concepts like an expanding space and singularities.

The cosmological constant

The cosmological constant originates from the observations of the astronomer Edwin Hubble. Initially the red shift of the light of distant galaxies was interpreted as Doppler effect: red shifted electromagnetic waves are emitted by objects that are moving backwards from the observer. But the Doppler effect couldn't explain the existence of distant galaxies. That's why the red shift is pinned on the expansion of space itself. Unfortunately quantized space cannot expand because it will expand everything in our universe. So there is another cause behind the red shift of the light of distant galaxies.

The time between the emission of the light by distant galaxies and the observation by telescopes can last billions of years. Therefore we cannot exclude the influence of slowly changing conditions in our universe on the results of the observations.

During the evolution of our universe the amount of matter is increased (the observation of the creation of non-linear structures[3]). But the emerging of matter in our universe is not a creation "from nothing". Baryonic matter is created by the concentration of quanta, fixed amounts of energy related to Planck's constant. It means that quanta represent fixed amounts of the basic properties of the units of quantized space (see figure 2). This has consequences.

If a part of a property of the units of the structure of the basic quantum fields is concentrated[4], the result is a separation of the general distribution of quanta within a certain region of space. One small part that contains a high density of the distinct property and a much larger part that has lowered its density. The distinct property is energy and that's why the creation of baryonic matter decreases the energy available in vacuum space.

Figure 3 shows the relation between the invariant volume and the variable surface area of 1 unit of quantized space. The creation of matter decreases the average amount of surface area of the units of quantized space in vacuum space. Vacuum space itself is a region in space where the Higgs field is flat; every scalar of the scalar field has an identical magnitude. In other words, at the left side of the horizontal line energy is restricted to the minimal zero point energy.

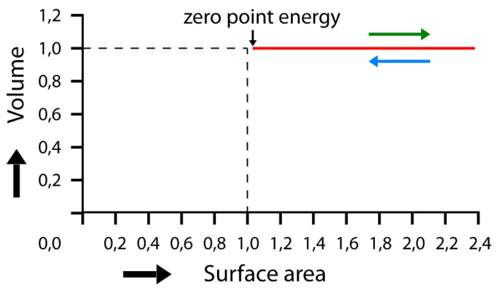

figure 3

The light emitted by distant galaxies has an energy that is described by the formula E = *h* f [f = frequency; *h* = Planck's constant]. The frequency is the number of wave lengths during 1 second and because light is propagating with a constant speed (*c*), the wave length is related in a direct way to the energy of the distinct light wave (the Planck-Einstein relation).

Baryonic matter is created at the cost of the average energy density of the electric field during the evolution of the universe. Light isn't baryonic matter, light is the *propagation* of an electromagnetic wave in vacuum space. Therefore, during the decrease of the energy density of the electric field the wave length of the distant light waves will slowly increase: red shift.

The consequence is the conclusion that the cosmological constant is interpreted in a wrong way because the hypothetical constant has nothing to do with the Doppler effect or with the expansion of space, the volume of our universe. See Einstein's lecture at Leiden University in 1920; spacetime describes only phenomenological observations, not the fabric of our universe.[5]

What will happen if the average density of the electric field nears the minimum?[6] If we create a volume without matter and with only a small amount of radiation left, it shows that decreasing the temperature even further has not the expected result. It is impossible to eliminate all the electromagnetic waves within the volume. The remaining radiation is called *zero point radiation*. The effect is caused by the conservation of quanta transfer within space because of the tessellation of the universe by the units of the structure of the basic quantum fields.

Figure 4 shows a reduced topological deformation of the units of quantized space in a schematic way. Zero point radiation is the future state of vacuum space in our universe if nearly all the available quanta of the electric field is concentrated and transformed into matter.

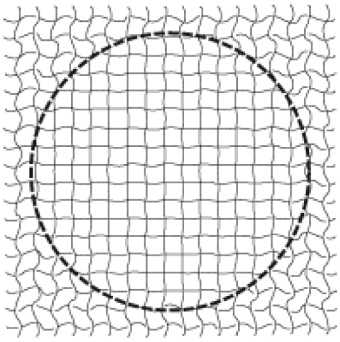

figure 4

Dark matter

If we accelerate an object the mass of the object will increase. To accelerate an object we must apply energy to the object: an amount of quanta. It was Albert Einstein who showed that mass and energy are equivalent.[7] The energy we need to accelerate matter is only accessible if we have transferred quanta from somewhere else. Like all the quanta that is available in vacuum space: the average topological deformation of the electric field within a region of the flat Higgs field.

Dark matter is a concentration of topological deformation – quanta – in vacuum space, see figure 5. Because a quantum is a fixed amount of topological deformation, energy.

Mass doesn't emit electromagnetic radiation, nor do Dark matter. Mass does influence the trajectories of electromagnetic waves and so does Dark matter. Actually, mass is a local concentration of quanta that is obtained from the average deformation of the electric field in vacuum space. An average deformation that is represented by the red horizontal line in figure 3.

Dark matter is clustering together (like clouds) in vacuum space. It cannot form matter because of e.g. to much turbulence of the local electric field by electromagnetic radiation and high energy particles. That's why we can hardly detect Dark matter in our solar system. The solar wind of high energy particles tears the clustering Dark matter apart.

Conclusion: Dark matter represents local concentrations of topological deformation of the electromagnetic field.

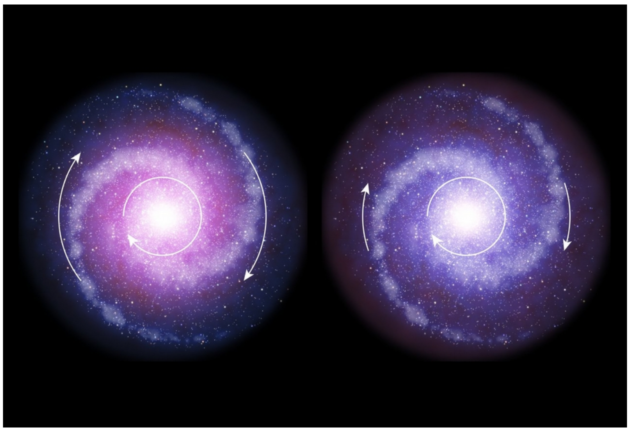

Figure 5. Schematic representation of rotating disc galaxies in the early Universe (right) and the present day (left). Observations with ESO's Very Large Telescope suggest that such massive star-forming disc galaxies in the early Universe were less influenced by dark matter (shown in red), as it was less concentrated. As a result the outer parts of distant galaxies rotate more slowly than comparable regions of galaxies in the local Universe. (ESO 2017)

Cold Dark matter is another word for the average deformation of the electric field within vacuum space in the early universe: less concentrated hot Dark matter.

Dark energy

At the moment the primary method to observe our universe is with the help of electromagnetic waves. The frequency, the spectral lines, the polarization of the electric and magnetic field and even the brightness of sources of electromagnetic waves. That's why Dark energy is related to the red shift of the light of galaxies in relation to the observed distances of these galaxies.

The red shift in relation to the distance of the sources of the light shows a slow increase of the red shift. Cosmologists have interpreted the observations as an unknown source of energy that forces space to accelerate the expansion.

However, the red shift of distant galaxies isn't related to the expansion of space so how must I interpret Dark energy? Moreover, the law of conservation of energy and the conservation of quanta transfer in space[7] exclude the existence of some miraculous source of energy supply in our universe. That's why it is reasonable to examine the way the distance of large amounts of far away galaxies is measured (see figure 6: Johns Hopkins news release 25-04-2019).

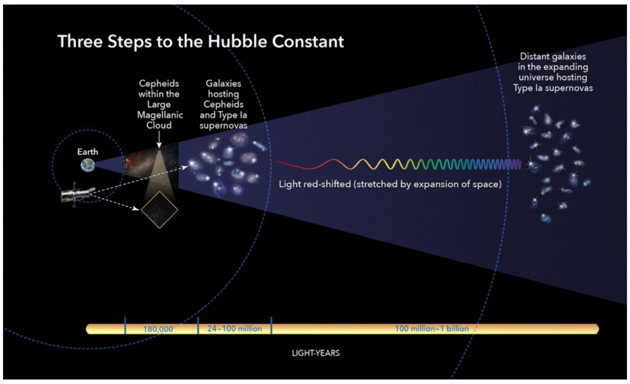

figure 6

The measurements show a 9% increase of the redshift of galaxies in relation to the calculated redshift with the help of the distance of the source of the light waves. But in the early universe the average deformation – energy – of the electromagnetic field was higher that today. Besides that, the decrease of the average deformation – energy – of the electric field during the evolution of the universe isn't a "stand-alone" phenomenon. The synchronous emergence of matter creates Newtonian gravity and gravity is responsible for the nuclear processes inside stars.

The scalars of the Higgs field represent a fixed amount of energy. If the number of decreased scalars raises – the creation of matter – the average Newtonian gravitational force slowly decreases if the matter is distributed quite equal in the universe. That means that far away galaxies are brighter – in the past – than galaxies at shorter distances to the earth.

Besides that, it isn't said that the decrease of the average deformation of the electric field will result in a synchronous increase of the amount of *matter* in the universe. To concentrate quanta it is necessary that the involved volume of space is quiet. Unfortunately, the more matter, the more electromagnetic radiation by stars, hot clouds, etc. The result of too much turbulence will be a clustering of mass – "hot Dark matter" – around galaxies. That means a slowly changing ratio between Newtonian gravity and mass gravitation (the concentration of mass within the electric field).

The Cosmic Microwave Background radiation.
If there was no big-bang, there never was a "red hot" singularity too. Unfortunately, the cosmic microwave background radiation is supposed to be the "ultimate" prove of the big-bang hypothesis (figure 7). But if our universe doesn't origin from a miraculous creation out of a singularity, what has the CMBR to do with the emergence of phenomenological reality?[8]

The electric field is a basic quantum field (topological field) and the Higgs field (scalar field) too. Local changes of the electric field create synchronous local vectors within the flat Higgs field and local vectors determine the hierarchy of the direction of the next deformation of the local electric field. All the changes of the of the electric field are synchronized because the structure of the basic quantum fields tessellate space.[4]

"*In the beginning of the last cycle of our universe*" there was no matter so there was no Newtonian gravity too. The Higgs field was flat – all the scalars had the same magnitude – and the only changes were caused by the fluctuations of the units of the electric field and the synchronous generated scalar vectors by the units of the electric field.

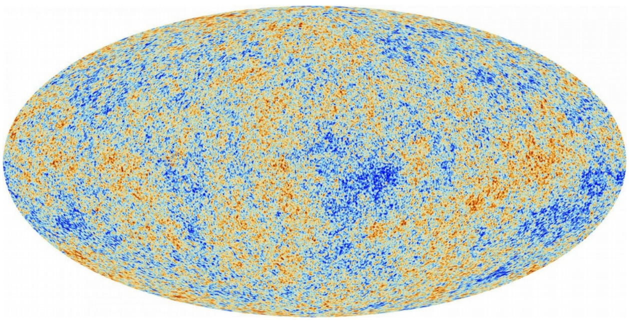

figure 7

If the symmetry of the quantum fluctuations of the electric field is high, elements deform quite randomly in relation to the adjacent elements. Like the spatial extension of the electric and magnetic field of an electromagnetic wave in relation to a single quantum shows (figure 8).

How long will it last before these quantum fluctuations can create baryonic mass? That's really hard to say because it isn't said that the creation of concentrations of quanta in the early universe resulted in the creation of baryonic matter. If the amplitudes of the electric field

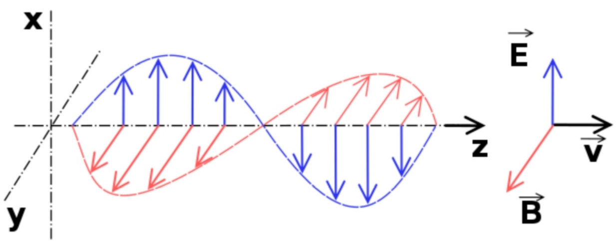

figure 8

are minimal and the average deformation is maximal I cannot exclude that the volume that starts to concentrate quanta was much, much bigger than now (fig. 9).

A black hole is a concentration of an enormous amount of quanta so it is reasonable to consider the creation of black holes *prior* to the creation of baryonic matter. Because if black holes are created everywhere in the universe the average amount of deformation of the electric field in the universe will drop to a far lower level of quantum fluctuations. Simultaneously there is the creation of huge Newtonian scalar vectors within the flat Higgs field that eliminates the high degree of symmetry of the quantum fluctuations.

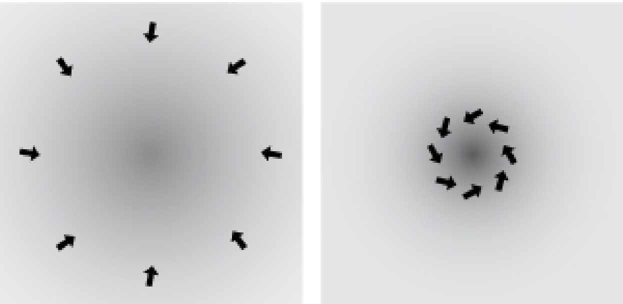

figure 9

If this is true baryonic matter emerged "after" the creation of black holes. The radiation of the created baryonic matter will show the characteristics of black body radiation because black holes don't emit electromagnetic waves. Nevertheless, the gravitational vectors will push the baryonic matter in the direction of the black holes.

A black hole and the region around are too small in relation to the volume of the whole observable universe – filled with emerging Hydrogen – to be visible at the images of the CMB. Fortunately, the influence of gravity on the polarisation of the microwave background is detectable. See figure 10 (image from BICEP2 Collaboration).[9]

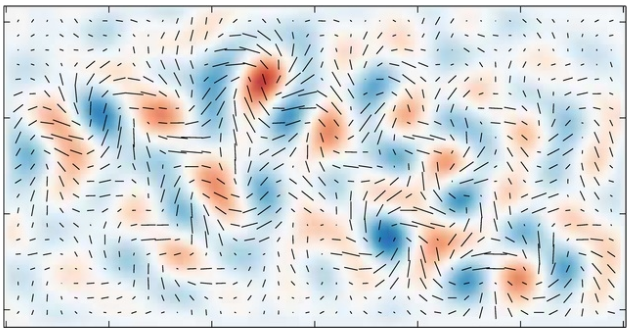

figure 10

At the moment this scenario is maybe the only reasonable explanation to understand the observed discrepancy between the creation of limited concentrations of quanta – baryonic matter – by the underlying structure of the basic quantum fields and the observed fast formation of galaxies in the early universe.[10]

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