10 On Discrete Euclidean Space

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The paper is the tenth post of the blog "Discrete Euclidean Space" at https://www.conceptualframeworks.org.
The post is about the consequences of the redistribution of energy in the universe by the scalar mechanism of every unit of discrete space.

The constant speed of light

The topological deformation of every unit of discrete space is synchronized with the topological deformation of all the other units in the universe because the volume of every unit is invariant and all the units tessellate space.

The consequence is that there is equivalence between the topological deformation that is caused by a unit itself and the topological deformation that is caused by the 12 adjacent units around. That's why $\Delta V_{input} = \Delta V_{output}$.

Figure 1 shows a schematic representation of the evolution of the topological deformation of a number of units because of the "effort" of every unit to transform its shape into a full scalar. A continuos process of internal displacement by the scalar mechanism of every unit of discrete space. The evolution of the topological deformation shows the emergence of a "closed" loop between the highly deformed units in the centre of the concentration of deformation. Actually, it is just "closing" $\Delta V_{input} = \Delta V_{output}$ within a number of involved units.

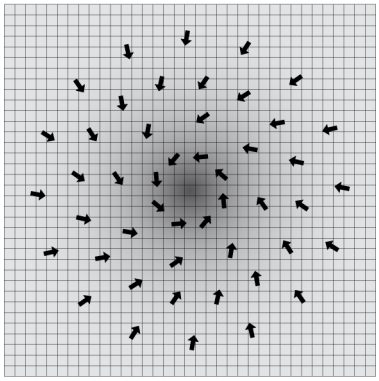

figure 1

Before the existence of a local field of gravitation by the creation of matter the process of concentration of energy is driven by the deformable part of every unit and the corresponding vectors in vacuum space, the electric and magnetic field. But the cause behind the concentration is the volume that is lowering its average topological deformation at the cost of the deformation of a small number of units within the evolving concentration itself. The end result is a volume whereof nearly all the units have transferred some topological deformation to a small number of of units in the centre of the volume.

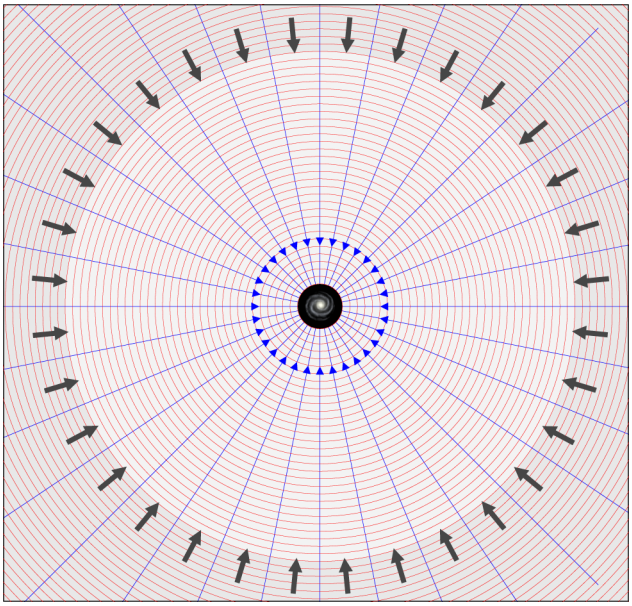

figure 2

If units decrease their topological deformation the units are decreasing their amount of surface area. In other words, to restore the former amount of average topological deformation within the volume every "stored" quantum in the centre must regain surface area again. In Einstein's formula $E = mc^2$ the surface area to apply to the mass (n x h) is c^2.

In the centre of figure 2 is the top view of a galaxy. The galaxy is created during the evolution of the universe. The primary concentration of energy in the early universe creats primordial Black holes. The consequence is a sharp drop of the amount of topological deformation in vacuum space. Without enough surplus of topological deformation in vacuum space the creation of primordial black holes stops. The process of concentration by the units of discrete

space doesn't stop but to create the same amount of concentrated topological deformation there have to be an enormous volume of less deformed vacuum space around.

But if the average deformation of the units is decreasing sharply in vacuum space the number of necessary "steps" to concentrate the fixed amounts of topological deformation (quanta) is exploding. Compare the increase of the number of units with the digits of the binary number system: 8 digits mean 256 different configurations, 64 digits have 18.446.744.073.709.551.616 different configurations as result.

If the average deformation in vacuum space is low in relation to the conditions at the start of the evolution of the universe the process of concentration is far more vulnerably to geometrical disruption. Therefore it is reasonable to propose that the continued process of concentration – the creation of mass (Dark matter), rest mass carrying particles and Hydrogen atoms – was mostly restricted to cold regions far away from the primordial black holes.

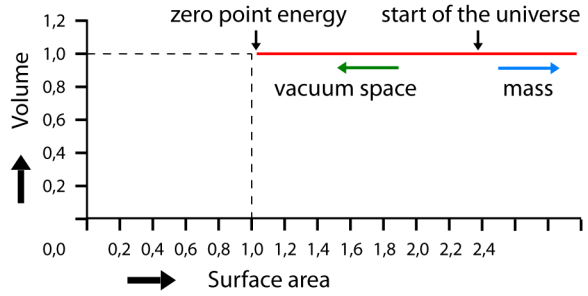

figure 3

The diagram above shows the consequence of the process of the concentration of topological deformation. The red horizontal line indicates the surface area of the units of discrete space during the evolution of the universe. In vacuum space the average surface area of the units is decreasing (green arrow) and the "surplus" is transformed into matter and Dark matter (blue arrow).

In other words, during the evolution of the universe the involved volume that contributes to the creation of matter that is part of the galaxy in figure 2 increases constantly. Not only large amounts of "single quanta" but also unstructured amounts of Dark matter. Figure 4 shows a schematic representation of rotating disc galaxies in the early universe (right) and at 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) because the Dark matter 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).

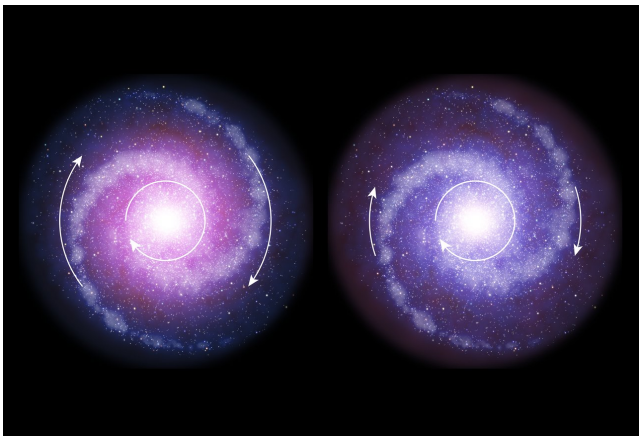

figure 4

The black arrows in figure 2 represent in a schematic way the concentration of quanta in space by the electric field and the blue arrows represent the scalar vectors of Newtonian gravity (**08**). But to make figure 2 more realistic I have to draw the black arrows of figure 1 into figure 2.

In the early universe the primordial Black holes caused huge scalar vectors of Newtonian gravity around in vacuum space (the blue arrows in figure 2). Scalar vectors that are super positioned on the scalar vectors of the magnetic field (**08**). One should expect that the influence on the Hydrogen atoms around by the gravitation of the primordial Black holes isn't detectable any more. However, the cosmic microwave background radiation (CMB)[1] still shows to be influenced by the early primordial black holes: the polarization of the detected CMB radiation by the BICEP2 Collaboration (figure 5).[2]

The decrease of the average topological deformation of the units in vacuum space during the evolution of our universe influences not only the amplitudes of the electric field, the corresponding magnetic vectors decrease at the same rate.

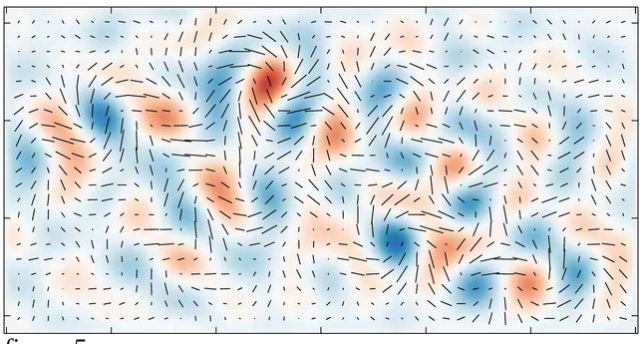

figure 5

Conclusion, an electromagnetic wave that was emitted in the early universe – and wasn't intercepted till now – has been forced to transform in accordance with the continuous flattening of the amplitudes of vacuum space.

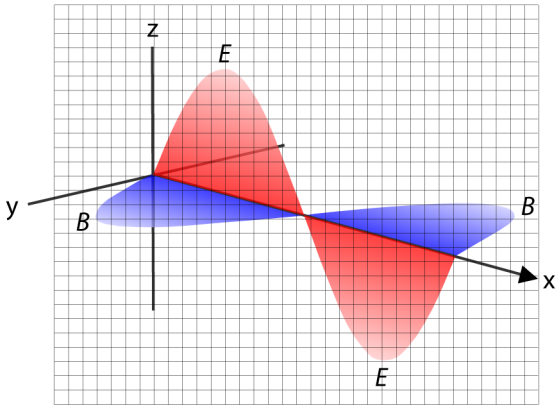

figure 6

The energy of an electromagnetic wave ($E = h\,f$) is determined by the amount of recurrent deformation of the electromagnetic field (vacuum space) by the transferred quanta.

But the recurrent deformation is not only determined by the energy of the electromagnetic wave itself, the symmetry of the waveform – see figure 6 – is determined by the equivalence of ΔV_{input} and ΔV_{output} (action = reaction).

Therefore, if the reaction of vacuum space around in response to the quanta of the electromagnetic wave is decreasing during the evolution of the universe, the wave length of the electromagnetic wave have to increase. The consequence is the red shift of distant light during the evolution of the universe.

References:

1. Ruth Durer (2015), "*The cosmic microwave background: the history of its experimental investigation and its significance for cosmology*" https://arxiv.org/pdf/1506.01907.pdf
2. BICEP2 Collaboration (2016). "Keck ArrayVII: MATRIX BASED E/B SEPARATION APPLIED TO BICEP2 AND THE Keck Array" https://arxiv.org/pdf/1603.05976.pdf

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