String theory and the grid dimension

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Abstract: In string theory energy comes in the form of Planck length sized strings vibrating at different frequencies. The questions that arise from this model are: why is the Planck length so unique? How can this model explain the non-locality of quantum mechanics? This paper will show another approach to string theory where the strings are made from quantized local spacetime units and an extra non-local grid like dimension (the grid dimension). This approach can enable a visualization of the non-locality behavior of quantum mechanics.

1. *Introduction:*

String theory describes the basic building block of the particle field as a Planck sized string in the size of Planck length (figure 1). The vibration harmonics generate the different particles that we observe today in our most powerful measuring tools. This theory cannot explain the non-locality of quantum entanglement (figure 2), "spooky action at a distance" – Albert Einstein.

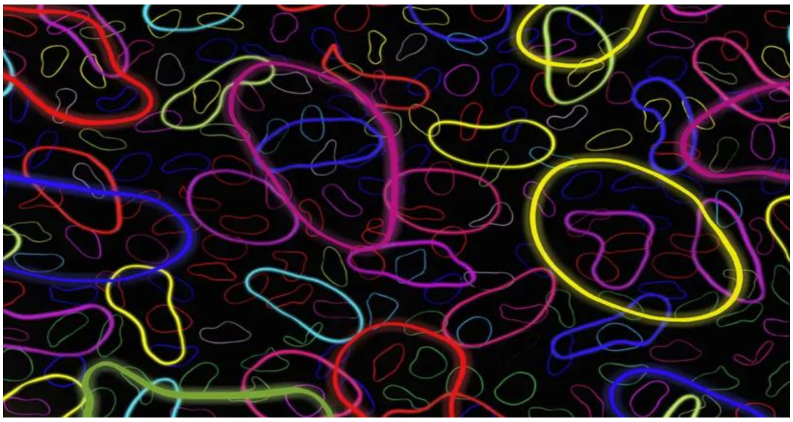

Figure 1: an illustration of the Planck sized strings of the string theory approach (each color represents a different vibration of the string).

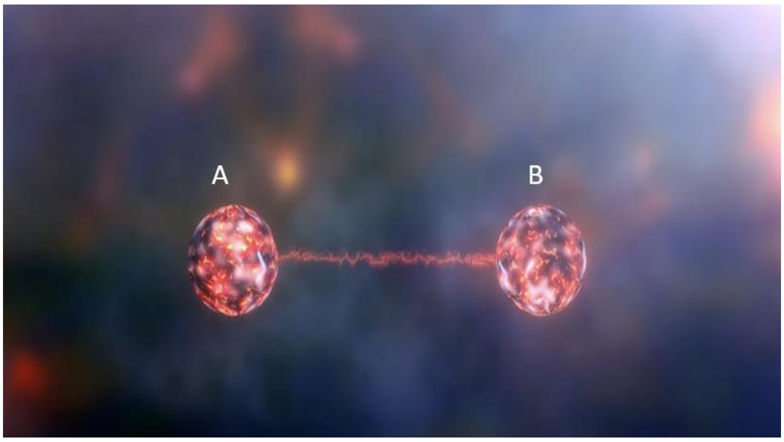

Figure 2: illustration of quantum entanglement nonlocality. The local Planck sized strings cannot explain the non-locality of quantum mechanics.

2. *The grid dimension:*

Imagine a quantized spacetime where each local unit of space is a symmetrical sphere in the radius of Planck length. Between these spheres is another three-dimensional non-local grid like dimension. The vibration of the space-time local spheres behaves like the string theory approach where different vibrations generate different fields of particles. The nonlocal grid dimension between them enables the non-local behavior of quantum mechanics like quantum entanglement and Schrodinger's wave equation for the particle's position (figure 3). The local quantized space units are the position of the particle, and the non-local grid dimension is its momentum. The more you zoom in with the local position of the particle quantized space the less information you have about the grid dimension and its momentum. The more you zoom out for a better understanding of the particles nonlocal grid dimension, you have more information about its momentum, but you lose information about its position. This is Heisenberg's uncertainty principle (figure 4).

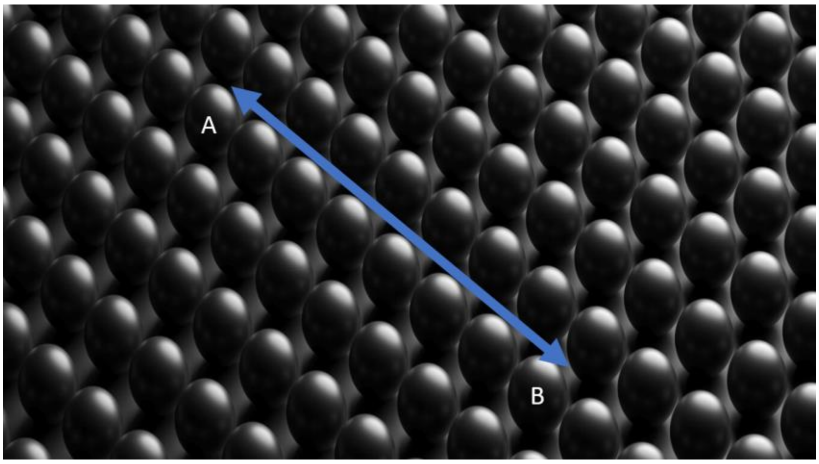

Figure 3: the sphere-shaped objects illustrate the local quantized space units in the size of Planck's length. The vibration of these space units in time generates the field of particles. The Planck length sized quantized space units are the strings themselves. The grid like shaped space between them illustrates the extra non-local grid dimensions. The blue arrow illustrates the non-local connection of quantum entanglement between A and B ("spooky action at a distance" – Albert Einstein).

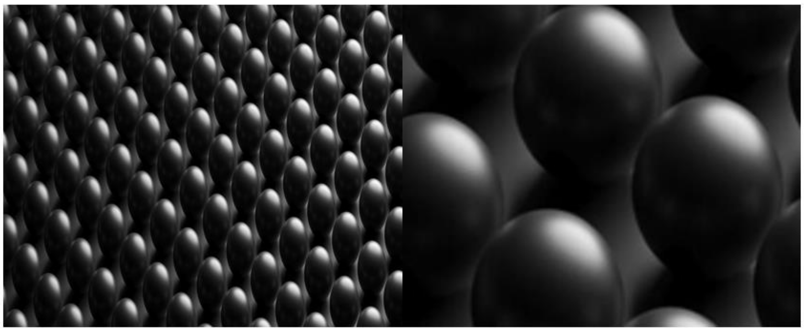

Figure 4: On the left-hand side, a zoom-out measurement enables to measure in wide angle the non-local grid dimension (momentum) with a lower precision of local position. On the right-hand side, a zoom-in measurement enables to measure in higher precision the local position with narrow angle the non-local grid dimension (momentum). This is Heisenberg's uncertainty principle.

Conclusion

String theory explains the limitation of the Planck length in physics but cannot explain the non-locality of quantum mechanics. If we imagine a quantized space in the resolution of Planck length and we add the non-local grid like dimension between the local quantized space units we can explain both the limitation of Planck length and the non-locality of quantum dimension. This grid structure enables us to visualize the gravitational curvature of spacetime (figure 5).

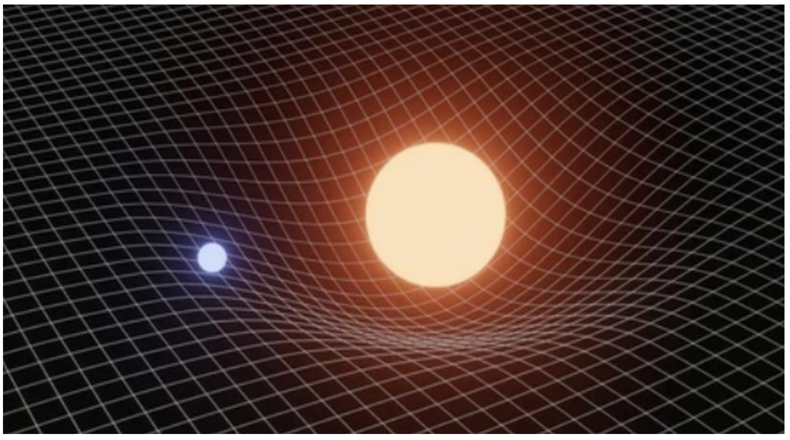

Figure 5: a better visualization of the spacetime curvature due to the quantized local space and the nonlocal grid dimension approach. This paper suggests that the grid dimension is not just an illustration to visualize curvature of space, as can be seen in many illustrations, it’s a real extra three-dimensional nonlocal grid like dimension, dividing the standard three known local dimensions to quantized Planck sized space units. This is the Yin and Yang of local and non-local structures that build up together the fabric of space. It was always there in the curved space illustrations but never taken seriously as a real, extra, three-dimensional non-local grid shaped space. If we add a quantized time in the order of Planck time to the spacetime structure, and information is limited to Planck length sized quantized space unit in one Planck time unit, we get the speed of light (c) limitation defined by Einstein’s special theory of relativity.