

## Wormholes and the grid dimensions

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### *Abstract*

There are two non-local phenomena that cannot be visualized by our standard local three-dimensional concept of space. These phenomena are quantum entanglement (EPR) and the unique results of general relativity in the form of wormholes (ER). Lately it has been suggested that these two are the same phenomena (ER=EPR). In order to visualize them, one dimension was reduced suggesting that our space is a two-dimensional hologram. This paper suggests a new way to visualize these non-local phenomena by quantizing the standard three-dimensional local space and adding an extra non-local grid dimension between the quantized space units.

### *Introduction*

A special solution of the Einstein field equation is a tunnel (“worm hole”) which connects disparate points in space in a non-local way (faster than the speed of light). But looking at figure 1, where Alice is on one side of the wormhole while Bob is on the other side, the main questions are: Where in the local space is the non-local tunnel that connects between them? How can it be that we cannot see or disconnect this tunnel?

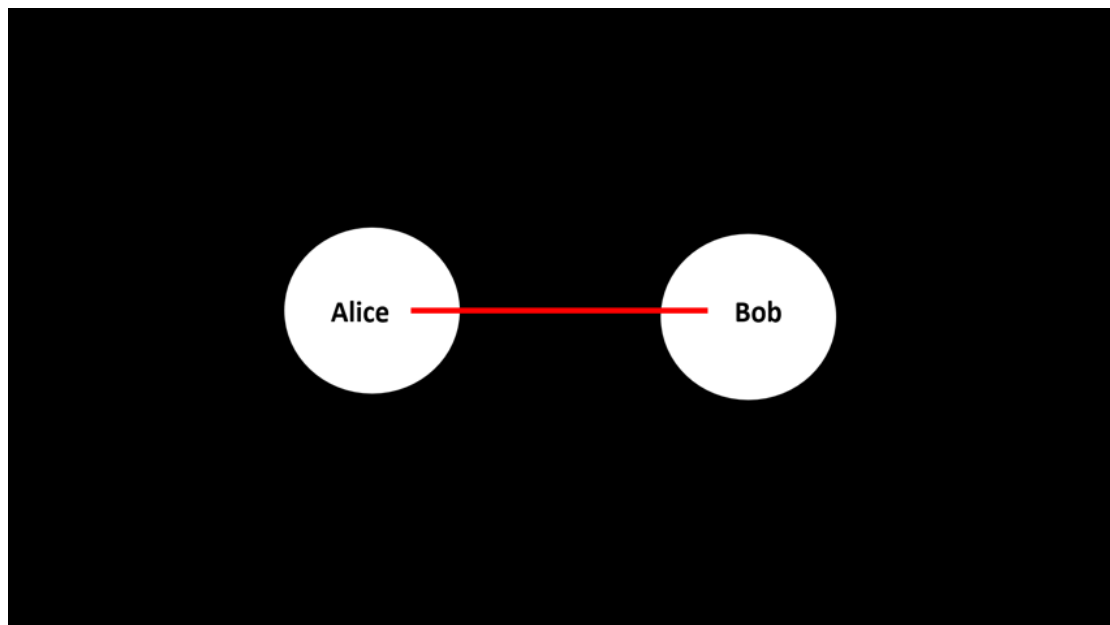


Figure 1: the white circles are black-holes, the black background is the three-dimensional local space and the red line is the wormhole connecting the two black holes in a non-local way which cannot be visualized in a three-dimensional image.

This is the space model common today which cannot explain the non-locality of the worm hole (where does it pass through in the local three-dimensional space?).

## *The grid dimensions*

Let's quantize our three-dimensional spacetime into local three-dimensional quantized units in the size of Planck length in each of the three dimensions. These space quantized units are floating in another non-local three-dimensional grid like dimension. Looking at figure 2, we can now visualize the "worm hole" tunnel connecting through the grid dimension between Alice and Bob in a non-local way through spacetime. Since all physical measurements are done only through the quantized local three dimensions of space and not through the grid dimension we cannot see or interfere with the wormhole.

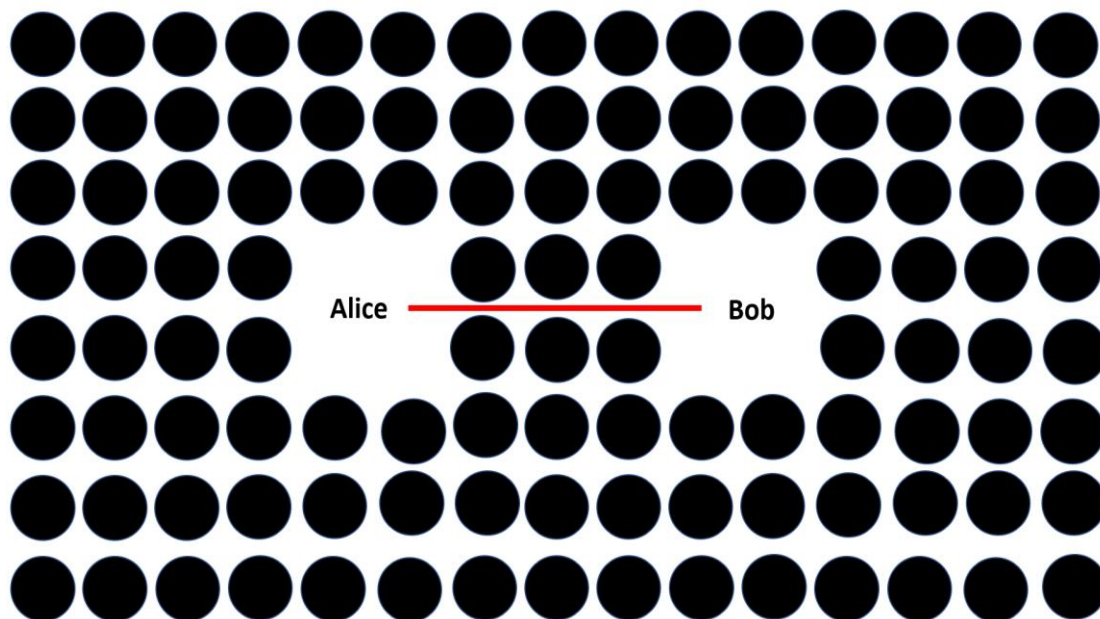


Figure 2: By quantizing space to three dimensional local units in the size of Planck's length (illustrated as the black circles), we can introduce a non-local three-dimensional grid like dimension between them (illustrated as the white space between the black circles). This extra non-local grid dimension enables non-local connections like quantum entanglements and wormholes.

## *Conclusion*

The non-local grid dimensions and the local quantized space dimensions Are like the Chinese Yin and Yang (figure 3) where the grid dimension enables the non-locality of quantum mechanics (entanglement) and the non-locality of The Einstein's unique field equation solution of wormholes (ER=EPR). This model enables to visualize these non-local connections in a symmetrical, three-dimensional space.



Figure 3: The non-local grid dimensions and the quantized local space-time behave like Yin and Yang.

## **REFERENCES:**

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