

Riding on a beam of light

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Abstract: When Albert Einstein imagined himself riding on a beam of light, it was the trigger for developing his special theory of relativity. This paper will keep on trying to imagine the passage of space-time from the perspective of a photon to reveal new insights on the fundamental structure of space-time.

1. Introduction

Alice and Bob are in two different frames of reference (let's assume the two frames of reference are moving one towards the other). A beam of light reaches the two frames of reference (sometimes will be referred to as reference frames). Both Alice and Bob will agree that the photons are travelling at the speed of light relative to their frame of reference. Based on that logic from the photons frame of reference, both Alice and Bob are moving towards the photons at the speed of light. That is impossible since Alice and Bob are in two different frames of reference. This paradox leads to the only possible conclusion that photons have no frame of reference. How can that be? How can we visualize that?

2. *The need for a new nonlocal dimension and a field of reference frames.*

A new theory regarding spacetime should be taken seriously not only when it can predict a new measurement but also when it can visualize a spacetime structure that can overcome a paradox like the one described above. The only way to overcome this paradox is to agree that for the photon there is no frame of reference even though it propagates in spacetime. The standard four dimensional spacetime structure cannot visualize that. To overcome this barrier, this paper suggests quantizing spacetime into Planck length and time sized units. Each frame of reference can be visualized as a quantized matrix. Spacetime can be visualized by staggering them together into a reference frame, four-dimensional (space & time), matrix shaped field (figure 1). In the space between the quantized field, we can introduce an extra nonlocal grid like dimension (the grid dimension).

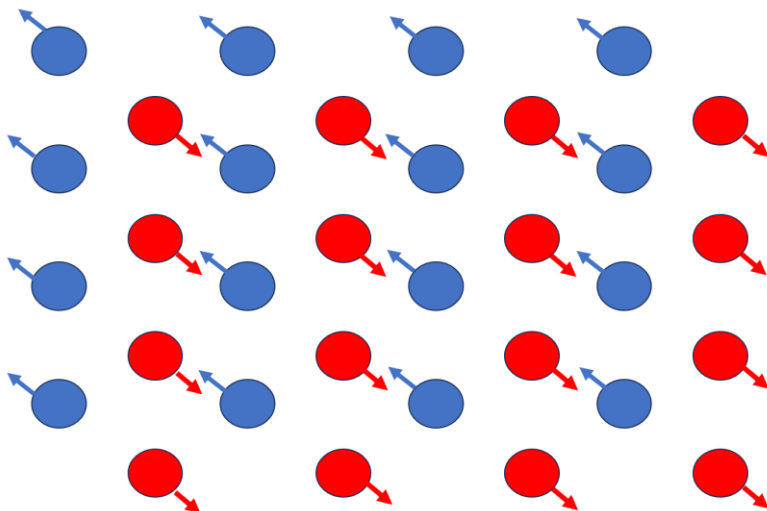


Figure 1: An illustration of a quantized frame of reference matrix shaped field, at a specific time frame, and the extra grid dimension. There are infinite number of reference frames staggered in the matrix field, but in this illustration only Alice and Bob quantized frames of reference are illustrated for simplification reasons. The red circles illustrate Alice quantized frame of reference Planck length sized units, and the blue circles illustrate Bob's quantized frame of reference Planck length sized units, and the red and blue

arrows illustrate that the frames of reference are moving in different directions. The figure is two dimensional, but it illustrates a three-dimensional space. The white grid-like region between the red and blue circles illustrates the extra non local grid dimension.

Photons do not have a frame of reference and they will travel only in the grid dimension as can be seen in figure 2. This illustrates why the same speed of light will be measured throughout the entire reference frame field as required by special relativity.

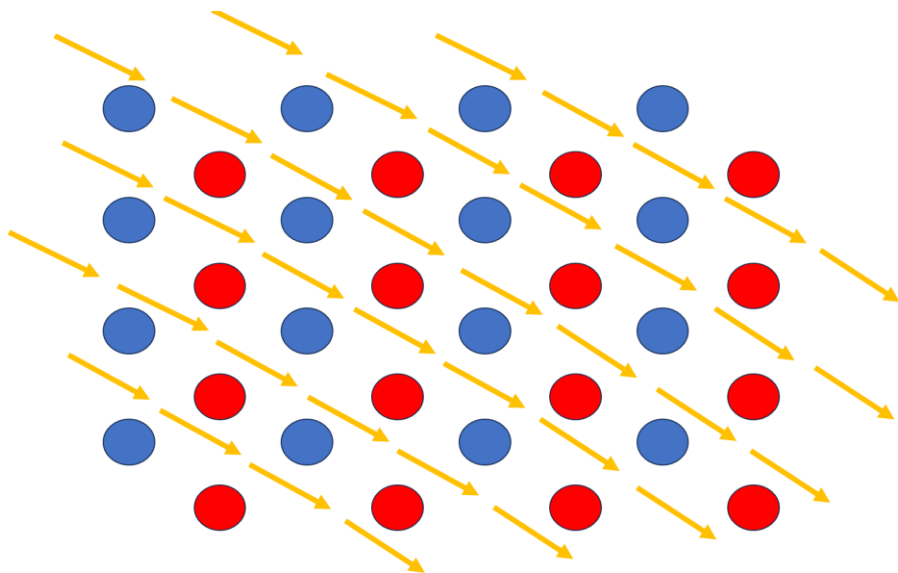


Figure 2: the red and blue circles illustrate Alice and Bob's quantized frame of reference matrix. The white space between them illustrates the grid dimensions. The photons travel in the grid dimensions only and that is why the photon is massless and travels at the speed of light within the entire frame of reference field.

Conclusion

Photons are massless and they have no frame of reference (they travel at the same speed of light at all frames of reference). This paper suggests a new bold structure of space time where spacetime is built from a field of quantized frames of reference staggered next to each other floating in the nonlocal grid dimension. Photons can travel only through the grid dimension and that is why they are massless and have no frame of reference. The grid dimension enables also the non-local instantaneous "spooky action at a distance" of quantum entanglement. A particle with mass has its own frame of reference and it is part of the reference frame field as it moves through spacetime.