

The Newton bucket argument and the quantized space-time

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Abstract

Isaac Newton's spinning bucket argument [1] demonstrating true spinal motion reference to an absolute space, stand in conflict with Einstein's special theory of relativity which defines relative spin without an absolute frame of reference. This paper will solve the conflict by introducing a quantized space-time with a staggered frames of reference structure.

Introduction

Newton's thought experiment representing the same idea, can be described by mass A spinning in a circle around central point B. Due to the centrifugal and Coriolis force, Mass A will measure that it is spinning in a circle. Based on Newton's argument, this measurement cannot be explained by a model in which mass A is standing still while the empty space is spinning around it (figure 1). This non-equivalence contradicts Einstein's theory of special relativity [2] in which there is no absolute motion through space, only relative motion.

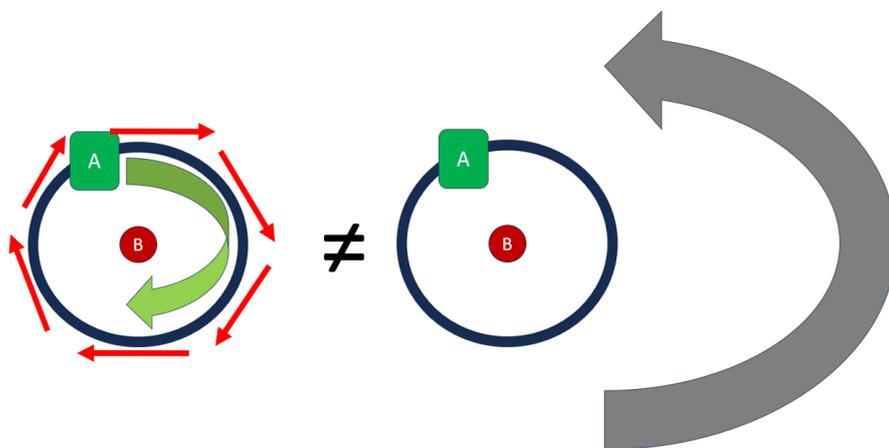


Figure 1: On the left-hand side Mass A, connected to a round ring, is spinning clockwise (together with the ring) around central point B, while the surrounding empty space is standing still (this is from the point of view of the surrounding space frame of reference). Due to centrifugal force, mass A will measure this spin pattern as expected. On the right-hand side, the surrounding empty space is spinning counterclockwise around central point B, while the round ring with mass A is standing still (this is from the point of view of the round ring and mass A frame of reference). Since the surrounding space is empty and cannot apply any centrifugal and Coriolis force on mass A, Mass A should not measure a spin pattern when it is standing still, while empty space is spinning around its central point B. There is a non-equivalence between the expected measurement results of mass A due to its spin around central point B (left hand side) and due to the spin of the empty space around its central point B, while mass A and the ring are standing still (the right-hand side). This is Newton's bucket argument to prove that there should be an objective frame of reference, and this contradicts Einstein's relativistic approach. The black circle illustrates the ring, the green rectangle illustrates mass A attached

to the ring, the red central small circle illustrates central point B, and the gray arrow illustrate the spin of space around its central point B while mass A and the ring are standing still. The red arrows represent the spin frame of reference, and they generate centrifugal and Coriolis force. They do not appear in both cases as expected, and that is a contradiction to relativity.

The frame of reference field and the extra grid dimensions.

This paper suggests a new approach towards space in which space is quantized into Planck length sized vectors pointing symmetrically to all the three-dimensional space directions (figure 2). Between these local space units lays another non-local grid like dimension dividing these units apart from one another (the “grid dimension”). This new structure will be referred to as “the frame of reference field and the extra grid dimension)

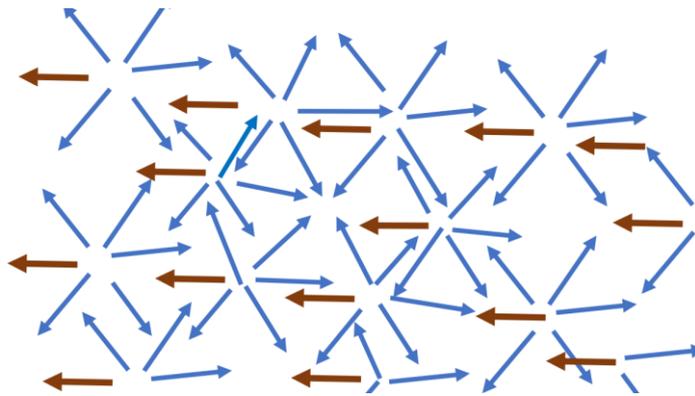


Figure 2: A two-dimensional illustration of the four-dimensional quantized space-time, where each arrow represents a Planck length sized vector of space in a specific moment in time, where each arrow points to the direction of its specific frame of reference. The arrows will point symmetrically to all the infinite number of optional reference frame directions in space. The brown arrows pointing in the same direction illustrate one specific frame of reference where the size of each arrow is the Planck length. The other blue arrows illustrate the other infinite number of reference frames. The white space between the arrows illustrates the extra three-dimensional (four dimensional with time) nonlocal grid like dimension (the grid dimension). This extra nonlocal grid dimension enables to stagger all these quantized Planck length space-time arrows next to each other, and its non-locality (it is spread all over as a grid), can explain the non-local behavior of quantum mechanics (quantum entanglement “spooky action at a distance” [3], Schrodinger’s wave collapse [4], Feynman path integrals [5], quantum tunneling [6]). This illustration represents the perspective of only one specific frame of reference out of the infinite number of reference frames. Each frame of reference will see a different space-time vector structure from his point of view. This new structure of space-time enables us to construct an image of staggered (or floating) quantized Planck length sized space-time vectors in an extra nonlocal grid dimension, where each vector pointing direction represents a different frame of reference (sometimes in this paper referred to as reference frames). Based on this new structure of staggered quantized reference frames, mass A will feel centrifugal and Coriolis force equivalently due to its spin around its axis (central point B) and due to the spin of the staggered frames of reference (the field of reference frames vectors), around the same central point B (figure 3). This means that there is no empty space, there are fields of staggered quantized reference frames in a non-local grid dimension (the grid dimension is not referred to as a field due to its non-locality behavior meaning faster than light quantum entanglements).

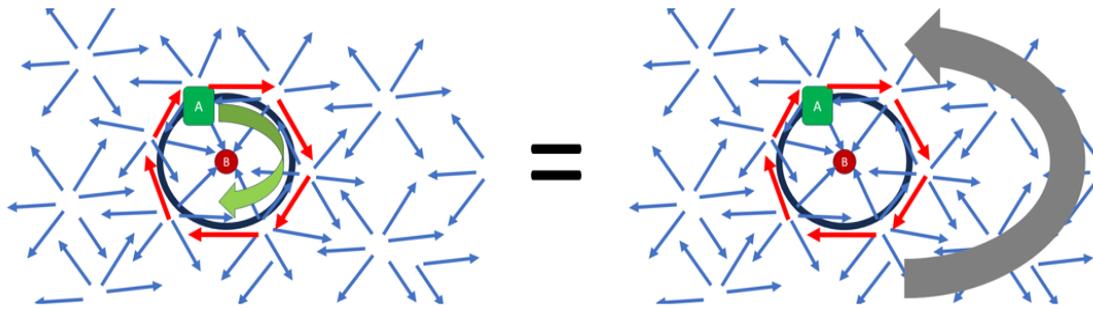


Figure 3: With the frame of reference field model, mass A will measure an equivalence between its clock wise spin (with the ring) around its axis, central point B, through the standing still frame of reference field (the left hand side) and due to the counter clock wise spin of the reference frame field around the same axis, central point B, while mass A and the ring are standing still (the right-hand side). This is the expected result due to the relative motion equivalence approach of Einstein’s special relativity. In this case the Newton’s bucket argument can be explained by Einstein’s relativity motion approach. The black circle illustrates the ring, the green rectangle illustrates mass A, the red central small circle illustrates central point B. The blue arrows illustrate the infinite number of quantized reference frames. The white space between the arrows illustrates the extra three-dimensional (four dimensional with time) nonlocal grid like dimension (the grid dimension). The red arrows in this figure illustrate the frames of reference that represent a spin of the ring and mass A around central point B and generate the centrifugal and Coriolis force. This time the red arrows that illustrate the spin frame of reference appear in both cases, as expected by the symmetrical approach of relativity.

Conclusion

This paper suggests a new structure of space time field, by quantizing space-time into staggered vectors pointing to all the possible symmetrical directions of space-time, where each vector is in the size of Planck’s length, and the vectors are staggered (floating) next to each other in a non-local four-dimensional (space-time) grid shaped dimension (grid dimension). This model enables us to explain the expected centrifugal and Coriolis force (effect) to Newton’s bucket thought experiment no matter which frame of reference we choose to be at during the measurement. This quantized frame of reference field and the extra nonlocal grid dimension can be correlated with the Higgs field. The grid dimension might be the source for the virtual particles that pop in and out of existence as defined by Heisenberg’s uncertainty principle [7].

REFERENCES:

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