

Reimaging space within the context of the pilot wave theory

By Francois Poirier

dreamintheshell@hotmail.com

Abstract

Introduction

In this abstract I am going to suggest a different way of understanding space. I am going to try to incorporate it to the pilot wave theory or the De Broglie–Bohm theory https://en.wikipedia.org/wiki/Pilot_wave. This addition to the theory is an attempt to explain the weird aspects of the pilot wave theory: hidden variables, faster than light information transfer and determinism. This is a mathematically untested concept but if any of it has some potential it would need heavy modification. This is just a first draft for the solicitation of feedback or to create inspiration. I am not a mathematician, a physicist or an astronomer, I am blue collar. I came across this concept while researching the phenomenon of Deja-vu.

The concept of space

Our universe is expanding, even if what we know of gravity tell us it should attract itself and get closer together the dilemma is: it doesn't. We know by observation that the more we go forward in time the more space there is. Something stretches the space or creates more space as we go forward in time, we call it dark energy. But dark energy is really just a question mark put on an ununderstood number. The same goes for dark matter. Newton's law of gravity is precise (except for a few exceptions) to describe the interaction of objects at the solar system scale. At the scale of galaxies, however, the outer solar systems move much faster than they should, so we put a question mark on that number and we call it dark matter.

So dark matter and dark energy can be considered holes fillers of the inaccuracy of our current model of understanding the universe. Many attempts at explaining this phenomenon have been made, but none has quite succeeded... This is one of these attempt.

The concept is to imagine the existing space, not as something we move through, but something opaque that matter cannot move through. Instead, let's imagine that in order to move matter, space needs to be created or stretched (a bit like the great expansion). But if space would be created at a local level, all matter would move away from each other so fast that it could not stay together. Instead, let's imagine that space would stretch on a global level. The space needed for an atom to move, that space would be spread out throughout the universe, a bit like gravity has an effect on the whole universe.

This global spread of space would, at a universe scale, move most galaxies away from one and another. At a galaxy scale, it would create a push that would become stronger the farther the solar system is from the center. Therefore they would need more momentum in order to stay in orbit. And on a solar system scale, it would create gravity as we know it. As we speculate that the added space would spread throughout the universe, there would be more new space outside of a system than inside, therefore pushing, not pulling, it toward the center of its mass.

We know that energy comes under the form of heat or work. Heat could be perceived as the change in position over time at a molecular, atomic and subatomic scale. Work could be perceived as a change in position over time on a system at a physical scale.

Now, let's imagine a system that this energy is heat base only. It would consist of a huge amount of particles doing very small movements and those movements, in order to occur, would need to stretch the space in order to move. Just as we assumed earlier, this space is spread out throughout the universe. It's not clear to me when the space would stretch, at the initial movement or at the moment of collision between particles. The idea is that the space would stretch more outside of the system than inside, creating a pressure toward the center of mass that we know as gravity. Also, the hypothesis is that this newly created or stretched space would move away from the system at an unknown speed "w". We will explore this hypothesis in greater detail further below.

Let's look at work and let's hypothetically imagine a transfer of energy to a given system that is work base only. When energy is turned into work, gravity is applied to the front of the system during its acceleration and the energy is transformed or stored into momentum.

In order to give us some perspective, let's take one of Einstein's famous thought experiments:

"If you are in a room on earth or if you are in a room on a spaceship accelerating at the point that one g applies on the ship...there is no difference to the observers."

So we know that gravity is applied on a system when it accelerates. We know that energy has to be applied on that system in order to accelerate and that this energy is transformed into acceleration. We know that once a system stops accelerating, it has momentum (moves through space) but no gravity applies to it anymore. If that gravity would be the result of space colliding with the system moving through it, therefore creating a resistance (an artificial gravity) it should not only apply during the acceleration but also when the system only has momentum (it is still moving through space), but this is not the case. The only resistance applying to the system is the force of gravity of other objects. Therefore, we can assume that this gravity is not artificially applied to the system through the resistance of space.

Let's look at what change in a system when energy is applied to it via acceleration and turns into momentum. The mass is, in theory, the same but the velocity change but velocity is just the change in position over time and it stays more or less the same as it goes forward. There is another change that is applied to a system when it has momentum...it's time perception, time moves slower for a system if it has momentum than if it does not.

Now let's combine both types of energy into our system. Let's apply energy to the system to make it move. As energy is applied some of it turns into work on the system (acceleration) and some of it turns into heat. The lost heat would create its space to move and would spread out. The work energy would be applied forward gravity to the system and would store energy into momentum. We said earlier that a system with momentum has a slower time perception. We could say that it has more particle movement per second in relation from outside the system. It is that extra movement that would create the extra space necessary in order for the system to move continuously unopposed. If the system collide with another system, the energy stored as momentum would be transferred into backward gravity... a crash for example.

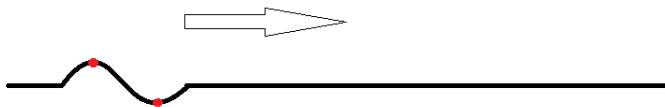
Pilot wave

So now, I know what you're thinking: this is preposterous! In order to understand, let's have a look at what happens at the quantum scale.

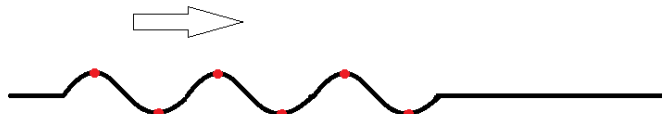
Let's start by placing a particle (red) on one dimension of space and without the dimension of time. The space has a length of x, if the particle does not move.



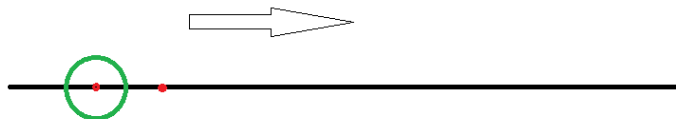
Let's add one wavelength worth of time. Now we see that the space no longer has the length of x , but it has more length. In order for the particle to move, the space needs to be stretch.



Now let's add 3 wavelengths worth of time. We see that the space had to be stretch even more.

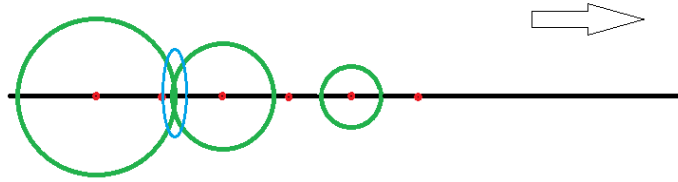


Let's rotate 90 degrees into a fifth dimension with again one wavelength worth of time. This would be the dimension in which dispersion of the stretching out of space would happen. The particle bouncing on it would create a ripple and that ripple would be the pilot wave (green). This video from Veritasium <https://www.youtube.com/watch?v=WlyTZDHuarQ> explain well this principle and the experiment "credit to Dan Harris and John Bush/MIT" was one of the inspiration for this theory.



Now let's put 3 wavelengths worth of time on that same dimension and spread the waves. We can see the famous interference pattern (circled in blue). In this model, we can see that the particle has a defined position at all times. The particle bounces on a fabric in the fifth dimension where the stretching of space is distributed and spreads over the whole universe at an unknown speed ' w '. Those pilot waves would guide the particles by allowing the space to stretch. The particle movement would be dependent on the pilot waves in order to move and the bouncing (or movement) of the particle would create the waves that would spread out in all the

possible trajectories of the particle, and all this happens one particle at a time. The next particle would also be influenced by the previous waves and so on, creating the interference pattern that we see in the double slit experiment.



This model allows a fully deterministic universe with the pilot waves being the hidden variables. The spreading of waves in the fifth dimension may also allow information to spread faster than light.

So, in this new model we have seen that space needs to be stretched in order to allow movement. We have seen that the particles bounce on a fabric in a fifth dimension, which creates ripples that spread in all possible trajectories and stretch the needed space throughout the universe. Those ripples influence the trajectory of the particle creating an interference pattern.

Conclusion

In this abstract we have explored a new way of understanding space and added it to the pilot wave theory. We have also tried to conceptually understand gravity. I would like to call this new concept: The pear tree concept. In the future there could be attempts to create simple experiments to test this and there may also be ways to test it mathematically. If the new conceptualisation of gravity has potential, it could be applied to the 3 other forces and see what it gives. I will also work in clarifying my ideals and the links between them in the future versions.

Thank you infinitely for taking the time to read. Any feedback would be greatly appreciated.

By Francois Poirier

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