Retrocausality, Wheeler's Delayed Choice, and Simulation Theory Reinterpreted Via The Participatory Universe, 'it from bit', Time Travel and the Everett/Wheeler Hypothesis

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Abstract

This paper will deal specifically with the concept of extending some of the contentions and theories of John Archibald Wheeler into a more complete description of reality, supported in part by physical experiments. The subjects that will be dealt with are well known from quantum theory, and now lately - Nick Bostrom's simulation theory, but will be seen through a new reinterpretation that connects seamlessly, prior positions of Wheeler into a self-consistent model that defines the nature of the physical universe through the convergence of information universe models and the Everett/Wheeler hypothesis. Hints will be given, as to how the reported desires of so-called Silicon Valley billionaires to leave the simulated universe, can be fulfilled using on-the-horizon technology to accomplish time travel through the manipulation of the information based fabric underpinning reality. In whole, the following will be major points discussed:

1. J.A. Wheeler posited that even the greatest mathematical equation in the universe is missing something, the principle by which it can become real. He also said, "no phenomenon is a phenomenon until it is an observed phenomenon. "

2. Wheeler developed his theory of "it from bit", explaining that the physical world was based upon information at a fundamental level

3. Seth Lloyd, taking that thought further, said that the universe acts like a giant computer processing the information contained therein.

4. Nick Bostrom posited that, in fact, our universe is a computer simulation created by our post-human descendants in the distant future.

5. Philip K. Dick science fiction writer and visionary, in his 1977 public statements mentioned, that due to to events in the past being "reprogrammed", things in the present could be changed so that an alternate universe splits off.

*6. The universe is participatory, not just with humans, but everything else. *Just as various events cause a variety of phenomena, in the extreme cases, the universe responds in the extreme by producing alternate universes. This process resolves many of the issues related to quantum phenomena, parallel universes and time travel**

7. The detection of a simulated universe and escape therefrom is similar but not the same as doing so with an information universe. Escape from a simulated universe is impossible just as its detection may be. However, in this paper, a series of experiments will be presented that for the first time ever, establish such a possible detection as well as the method of ultimate escape from our information based universe.

John Archibald Wheeler, the late physicist from Princeton [1], had two very important ideas that seem to have been largely forgotten, leading to the exploration of their ultimate implications left to those outside the establishment of mainstream physics. These ideas are 'it from bit' [2] and the participatory universe [3].

I devised what I now call the Rachel and Emily RetroWorldality tests to see so-called retrocausality [4] in action, but on a macroscopic level. I use the term, *retroworldality* due to the fact the future isn't effecting the past without the involvement of parallel universes. The term, "worldality" is derived from the other known moniker for the Everett/Wheeler hypothesis [5], "the many-worlds interpretation". My argument is that when so-called "retrocausality" takes place, what is actually happening is Wheeler's participatory universe is producing a new one with a new past, not changing the past of the original. This is not as much of a radical idea as it may

appear. Other examples, such as Schrodinger's Cat [6], and Wigner's Friend [7], all involve the universe splitting caused by a *specific action*, such as observation or measurement. In the case of what I call retroworldality, the universe splits as a result of the action that causes the retrocausality, with the observed change being in the one with the new past. So, instead of the experiment changing the past, it creates a *new present* with a *different* past. This is important because in each of the other quantum experiments, it is the present that is changed even if the experiment implies the involvement of parallel universes. In this way, all the quantum experiments are *consistent*.

Retrocausality is as much of a fallacy as is time travel without parallel universes, for the same reason - paradoxes. Time related paradoxes, especially in the case of quantum retrocausality, violate the Copenhagen interpretation of quantum mechanics [8] which states in part that there is only one outcome per measurement. What is forgotten by most, is that it is not the actions of the time travelers that are important, in regards to paradoxes, but the geometry used to *achieve it*. After all, going back in time is a paradox in and of itself, because the very act of time travel is a paradox if not accomplished through parallel universes. So too, all so-called retrocausality experiments. The past is equivalent to an already made measurement, so any action that changes that, must involve a parallel world. However, in 2013 I realized that parallel universes alone are not enough to resolve the paradox issue due to the fact that a time traveler would not have been in one of those in the past either. This is what took me to look again at the work of Wheeler and then realized the same process that would cause his participatory universe to respond to human actions, would respond with a decoherence from the present to a new parallel universe copy of the past desired. This new copy would not exist had not the time traveler activated it by his actions and so it comes into being with him, because of him, and based on the same information as all the other parallel universes of that time that had come into being - because of the myriad actions that took place then causing decoherence. And, as with all the rest, the new copy past is information based, just as our present now and all of reality.

I have dubbed the following experiment, conducted originally in May of 2016, Rachel RetroWorldality, due to the fact that the set-up deals with more than individual photons but an entire laser beam fired from a laser pointer. The term, "Rachel" is my designation for this experiment, named after a certain young lady who took an interest in such goings on. Likewise, the second, more elaborate experiment is dubbed the "Emily" Retroworldality test, named for a similar young lady, and was conducted in November 2016.

I stripped the basic retrocausality experiment down to the main components because I was only interested in seeing if photons from a laser beam would change their path *after the fact*. The set-up was done as follows:

a. A laser is pointed at a 2 way mirror

b. The 2 way mirror splits the laser beam, sending the reflective beam to a side wall and the transmission beam straight through

c. The transmission beam next encounters an electric fan running, to serve as a fast moving shutter

d. The blades of the fan, unlike a single shutter or screen, as used in most cited experiments, are a rotating, high speed shutter, through which the laser must travel or simply impact. Impacts do not bounce off but can be seen as laser dots on the surface.

e. The laser is sent through this Rachel set-up in a variety of bursts of varying durations, adding a large amount of randomness and uncertainty to the process. Also, the laser is not bolted down but simply aimed in the predetermined, general target area on the 2 way mirror, that will result in a reflection on the side wall.

f. The whole affair was videoed with the web cam on a MacBook Pro using the Photo Booth program, which enables you to shoot and then playback videos both in real time and by manual frame by frame - by putting the playback mode in pause and using your finger across the touch pad to advance through the footage as slowly as you want. Stopping allows you to look at a single frame of video and then use the computer's screen grab function to select that frame or any part of it.

g. Not always, but at times, I surmised that a fan blade would come into rear alignment with a group of photons from the laser, causing them to act as if they had to correct for being in the wrong position when the path was changed retroactively. I predicted that that would result in a laser dot appearing on the side wall without normal explanation, since I was not sustaining a continuous beam, but laser bursts of varying lengths. I was correct. Without direct explanation, a number of times, a distinct laser spot appeared on the side wall at an instant where there was no laser being fired. The laser spot is dimmer and defocused, compared to the normal one, and there is no apparent source for it. In other words, the laser spot appears from *nowhere*, without a emission source. At the most, sometimes, there is a slight glow inside the fan cage, but such a glow would be incapable of producing a precise spot some feet away. In addition, the spot is exactly in the same area as it appears when its source is the reflection beam.

Fig 1: A view of the Rachel set-up showing the 2 way mirror, fan, side and back wall. Bright white orbs are from the laser interacting with the mirror, fan and wall.

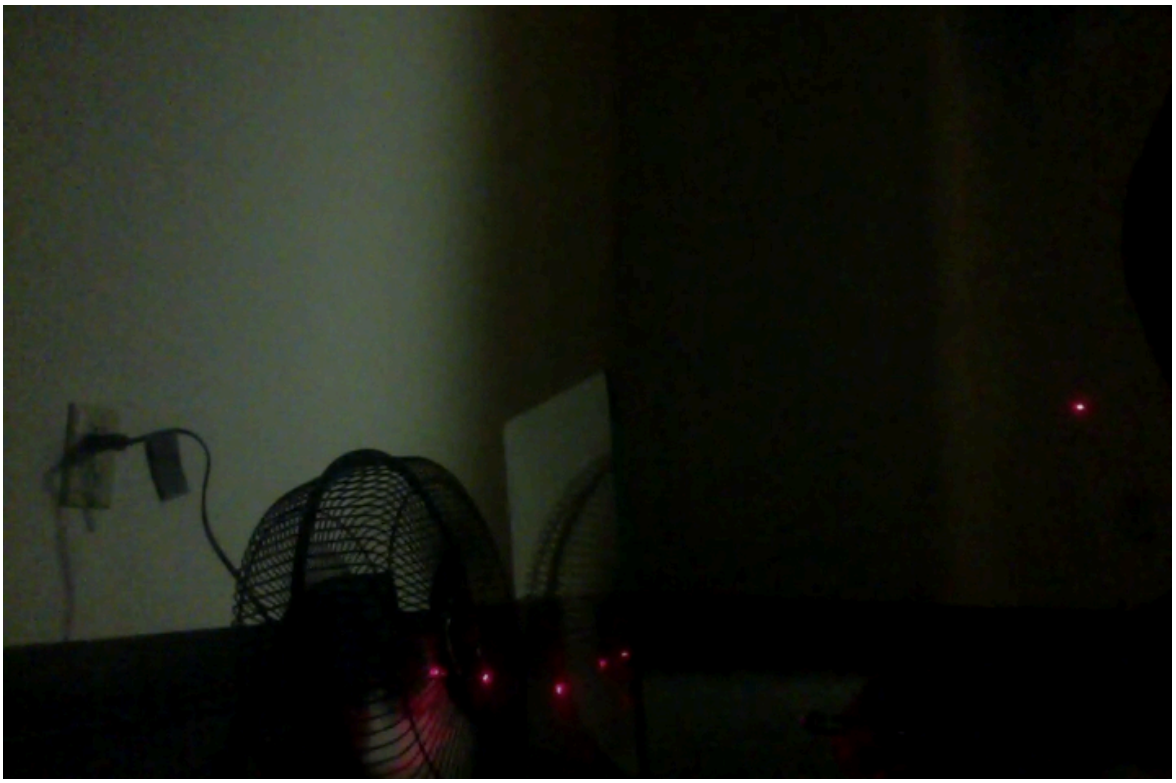

Fig.2: Laser can be seen interacting with mirror and fan while the reflective beam produces a laser dot on the side wall, seen toward the upper right corner.

Fig. 3 In this shot, the laser is off and yet a lone, dim laser spot shines for a exactly one frame on the side wall on the right side of this photo - again, perpendicular to the direction of the beam when it is on. There is a mysterious glow in the cage area of the fan and on the mirror, but far less prominent than the spot itself. It appears it could be a reflection of the light from the spot. Notice too, that this lone dot is not exactly in the same place as the reflective beam appears, but in the same area.

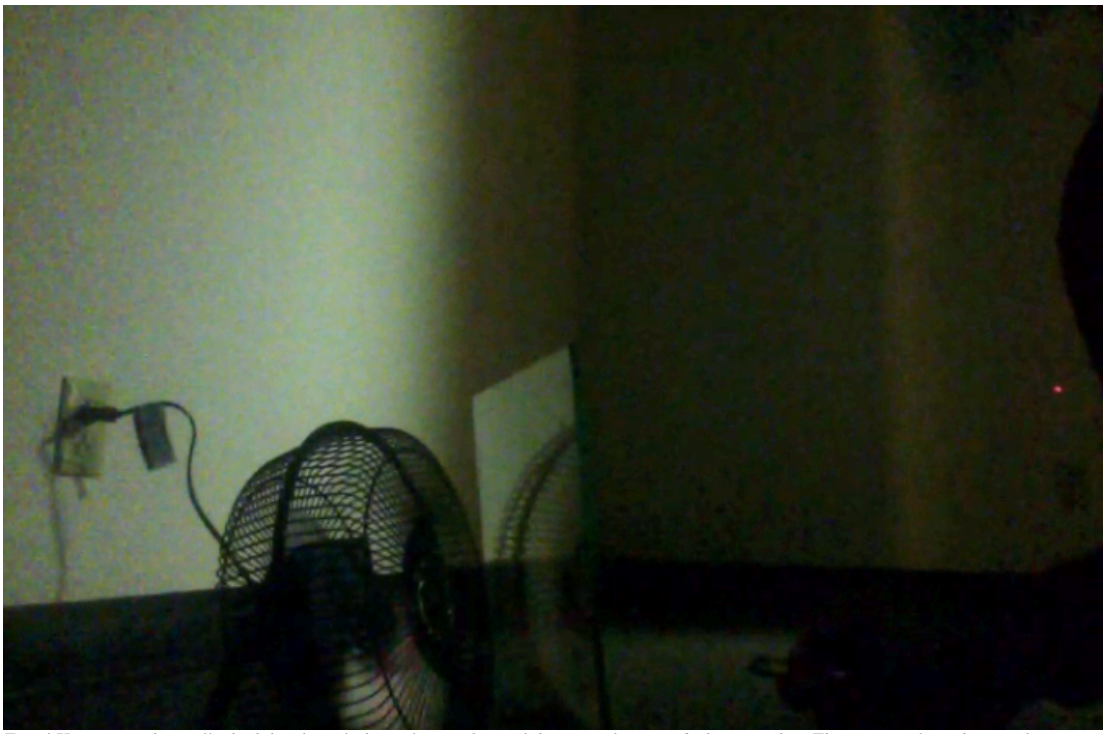

Fig. 4 Here is another still which has been lightened to see beyond the normal scope of what was shot. There are no laser hits on the mirror or fan, however the laser spot is still on the side wall. A slight red blur or glow is present, however, in the fan cage. and some faint red smudge spots in the mirror but upon closer inspection, those appear to be just color artifacts in the frame as some other slight red "smudges" can be seen on the right side of the picture. There is, however, nothing in the picture that indicates that a beam was fired that then reflected off of the mirror to put that spot on the wall.

As a result, the Rachel RetroWorldality test produces the same retrocausality type results already known, but much easier to observe and produce. However, keeping in mind Wheeler's Participatory Universe, I posit that the photons in this experiment (or any other of these related tests) are not reacting to *anything*. The subatomic particles have no brains, no awareness, no consciousness. No, for some reason, it is the Participatory Universe *itself* that is making these changes by splitting into various versions with the new configurations, just exactly like it does with Schrodinger's cat. In other words, all of these delayed choice and other table top tests, are

actually proof of the Everett/Wheeler parallel universe model and have been such, *all along*, but were simply *misinterpreted*. As physicist Louis Del Monte states in his article, *A Classic Time Travel Paradox - Double-Slit Experiment Demonstrates Reverse Causality!*[9]*:*

"Let us pause here and be perfectly clear. Measuring the future state of the photon after it has gone through the slits causes the interference pattern to vanish. Somehow, a measurement in the future is able to reach back into the past and cause the photons to behave differently. In this case, the measurement of the photon causes its wave nature to vanish (i.e., collapse) even after it has gone through the slit. The photon now acts like a particle, not a wave. This paradox is clear evidence that a future action can reach back and change the past."

But of course, like many physicists, Del Monte is wrong. That erroneous assumption leaves unanswered how such a result would be correct under the Copenhagen interpretation, among other things. It reflects a prevailing attitude in physics when it comes to the nature of time - avoid dealing with the issue head-on and just punt, make an excuse or ignore the matter altogether. Tim Folger, in writing about his chance to interview Wheeler for *Discover* [10] said - "By the time the astronomers decide which measurement to make — whether to pin down the photon to one definite route or to have it follow both paths simultaneously — the photon could have already journeyed for billions of years, long before life appeared on Earth. The measurements made *now,* says Wheeler, determine the photon's past." This was in reference to the delayed choice experiment as applied to two incoming photons journeying from beyond a distant galaxy and how astronomers detecting them *now* could be said to have changed the routes they began in the *distant past*. Clearly, the point here is that Wheeler himself saw this as an example of the *past having been changed,* but to leave it as it is, is problematic.

To reconcile the situation in greater detail, retrocausality overlooks the geometry of time by ignoring the fact that a particle in such an experiment always shows up later or changes its state (from particle to wave, etc), *after* the fact. That doesn't mean that the past has changed, as the catalyst for the change occurs after the original event took place, and the new result, *suggesting* retrocausality, only *appears* in the *present*. The discrepancy suggests that the past has changed but in fact what we have is a new present with an event that suggests a *different pas*t *event*. I invented a gedanken formula for testing time related paradoxes. I call it MCEBPS. Simply, it stands for Marshall's Copenhagen Everett Barnes Paradox Solution [11], the core part being the Copenhagen/Everett/Barnes portion. It works like this:

1. Any situation suggesting a time related paradox is seen as a violation of the Copenhagen Interpretation of QM, like a photon that changes its path after the fact, supposedly due to an altered past.

2. The assumption then is that the only real solution would be the Everett interpretation, meaning parallel universes are involved.

3. The Barnes portion is my contribution to the proceedings - looking for the recorded evidence that indicates the established, initial facts. In this case of my experiment, we have a film of the entire process. We see that at a point, when the laser is not on, a faint point of laser light appears on the side wall where the reflection beam would appear. Prior to that, we know that a reflection beam appeared, but now, after the source beam is off, we have this rogue, momentary, interloper, appearing from out of nowhere - as an after thought, in a similar fashion to all so-called retrocausality tests. However, the film shows that although the action appears to be the result of the fan causing laser photons to correct their path after the fact, and thus resulting in a changed past, we don't see that happen and neither do any other so-called retrocausality experiments. What we see is the result of an implied change in the past but we don't ever see that happen - just the *result* of it. This firmly places the cause of that result in the original universe and the result in a *new* universe.

If I check the film, nothing strange happens prior to the rogue laser spot appearing. The past is preserved in sequential order. What we do have is laser photons appearing from nowhere to imitate what they *would've done* if they had been part of the reflection beam. So instead of a sequence of continuous events showing normal cause and effect, we suddenly have the momentary interruption of interlopers from the past, in the original universe - appearing in the present *which is now a new one*. Their appearance in the present suggests that they have done something different in the past - switched their trajectory because of what the fan did, but that past is no longer the one in which we see this result. We don't have any evidence in the film that shows anything different prior to their appearance; just their appearance now, suggesting they have done something different. That means that their change took place as the universe split, causing a new one with the evidence in its present that they had done something different in the past - that is no longer part of the present timeline. As a result, that part is not on film and there is also no paradox. I want to be very clear - if we had seen any action indicating that the laser had gone back and hit the wall, there would be signs of the laser hitting the mirror in the opposite direction and then we would see the laser spot on the wall. That's *not what happens*. What happens is there's a moment of no laser light at all and then the laser spot appears on the wall *out of nowhere* for a single frame and then *is gone*.

I will illustrate further using an example from the book, *Parallel Universes: The Search for Other Worlds* by Fred Alan Wolf, PhD [12]. Photons are projected towards double slits and on to two telescopes, the distance between the slits and telescopes being sufficient

enough to allow for an experimenter to be able to intercede after the photons have appeared through the slits, but before they can reach either telescope. Wolf states that a photon will go through either slit and be detected by one of two different telescopes - however, there is a film emulsion screen that can be rotated into the path of the photons well after a photon has already gone through either slit and so then the wave-like nature of the photon will appear on the screen, which would be impossible if a single photon went through just one slit. Wolf explains the wave/particle duality by using parallel universes and John G. Cramer's transactional interpretation [13]. However, the retrocausality aspect is left as it is - an effect traveling back in time to change the cause. Actually, it is still explained by using Wheeler's participatory universe model as I do with retroworldality. When the screen goes up after the photon has passed through either slit, the omniverse responds (or participates) resulting in the ironic wave-like result - which is the only way such a result can be observed after the fact. The past for the photon has not been changed, the universe has just been split so now there's one where the photon is wave-like so it had to have gone through both splits, where in the original universe, it didn't.

The result is observed, once again, in the present, leaving us with an assumption about the past. That is where the mistake about retrocausality has been made. There is no paradox and everything is *self-consistent*, one thing about this that Wolf and I agree upon. In every retrocausality test, there is a trigger event that causes the split, just as there is one in Schrodinger's Cat, it's just that in delayed choice experiments, you must keep track of the action. The assumption is that the past has been changed but we know what the past action was. The change happened in the present which then changed the outcome in the present, discontinuously. It is like what Philip K. Dick [14], the science fiction author who claimed to be aware that he was living life in multiple realities, said in 1977 - "at some past time point a variable was changed, reprogramed as it were, and that because of it some alternate universe branched off". In my test, the laser point appears from no where, having tunneled from the past and into the future where it strikes the wall as it would had it been part of the initial reflection beam, but the film proves that it was not. That past is clear, however in the present, for a mere frame, it presents itself in that spot so at that moment, that present that follows has a new past because that laser did show up, but we know the original is still preserved in the original universe where the laser spot didn't show up out of nowhere.

What this new interpretation does is simplify and de-clutter quantum theory of ideas like "now makes the past" and "the future influencing the present" despite what Wheeler may have thought about what delayed choice meant. At one point, he's quoted as saying, "…it begins to look like we ourselves, by a last minute decision, have an influence on what a photon will do when it has already accomplished most of its doing…we have to say that we ourselves have an undeniable part in shaping what we have always called the past. The past is not really the past until it has been registered. Or put another way, the past has no meaning or existence unless it exists as a record in the present." [15]

This is important because this is Wheeler himself stating that the past isn't the past until it has been recorded. Remember, my MCEBPS formula ends with the Barnes element, which is the identification of the recorded evidence of the past which shows that it is already real and that the events resulting from time travel must be happening in a parallel universe. So all proponents of the concept of retrocausality, as changing the past, such as Louis Del Monte, are wrong - the past doesn't change - the present does - which has a new past and in this case we have a record of *both*.

Once he introduced the concept of the participatory universe, in one fell swoop, all those issues, as well as those concerning particle behavior, were essentially resolved, whether he understood it that way or not. It was the very nature of time that boggled Wheeler as well, his sensing that a resolution to that issue would ultimately be required. I deeply regret that he passed before I could share my ideas with him. I'm sure he would have been very excited.

I conducted a second set of experiments at a different location in a darker room - the Emily series, which involved a more complex arrangement. In addition, a mirror is placed so that now, the reflected beam hits it and then reflects off and strikes a sheet that is visible to the camera in the reflection of the mirror in the same frame as the rest of the set-up. It was during this series that more startling results presented themselves. In addition to a laser spot showing up from the direction of the reflected beam, an additional spot appeared at the end of the linear path that is preceded by the fan, with no apparent source beam having been fired. Often, this happened simultaneously, with the phantom, reflected beam spot.

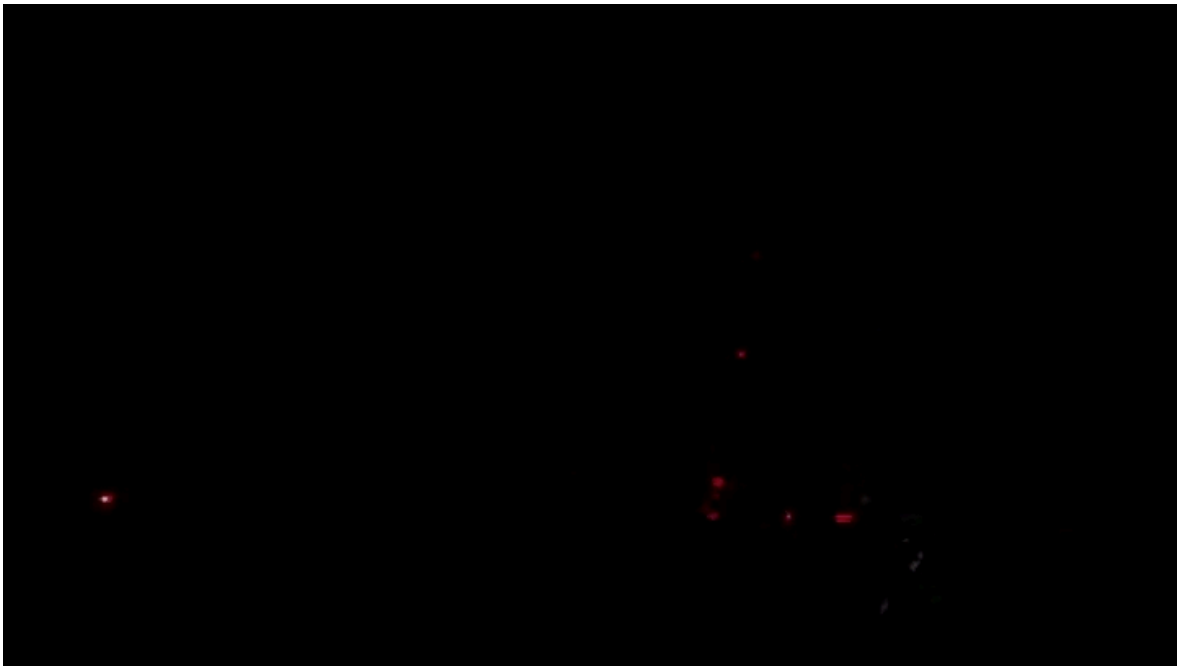

Fig. 5 Source beam begins to the right, with the reflected beam and reflections from fan blades below the spot of the reflected beam which appears after being reflected off the mirror which is out of the shot. In the far left is the laser spot from the source beam that made it through the set-up. This is the normal way it works.

Fig. 6 In the above photo there is no source laser but a ending point on the left with 2 laser points on the right which is where the reflection beam hits. However, there is no source laser, so all three spots have no classic explanation. One of the 2 spots is a hit on the mirror and the other a reflection of the mirror hit bouncing off a white sheet (not visible in the dark).

Fig. 7 Another example of the above except the laser spot on the right appears to be a reflection off the mirror onto the sheet with no reflection apparent.

What these images reveal is a profound example of what can be clearly viewed as an anomaly or glitch in reality. Laser beams don't appear out of nowhere - normally, yet in these cases *they did*. If it weren't for the fact that these incidents were being filmed, the events would be impossible to notice or at least recognize, as an event that lasts only a single frame - a 30th of a second, is impossible to recognize in real time - at 30 frames per second. As Wheeler said, "No phenomena is real until it is observed". This has been observed and recorded. Multiple times. The only variables are fan speed, pulse duration, mirror angle, type and size of fan. Because these are macroscopic examples of what normally happens on a single particle level, the phenomena doesn't always appear but, then again, when it does - it only lasts a single frame - making frame by frame analysis a requirement in order to determine the results. As far as I am aware, no one has tried to do such an experiment using a full laser beam - as opposed to simply individual photons from it.

At the fundamental level, everything is information. Though some posit that everything is conscious, such as Brian Whitworth in *Simulating Space and Time* [16], I disagree. The omniverse has a certain level of what I hesitantly call "awareness" in that it is possible for it to respond to certain things humans do, but to be conscious it has to have its own thoughts and desires and there is no evidence for that. Since I won't convey consciousness to things like photons either, my explanation for the Rachel and Emily Retroworldality experiments is simple - it isn't the photons reacting to the various changes in the set-ups, it is the "omniverse".

Just as when in Schrodinger's Cat, the observation causes decoherence resulting in a universe with a live cat and one with a sleeping cat (I'm inserting the PETA approved version), in the case of the Rachel and Emily experiments, the universe in question decoheres resulting in a new universe where we see the laser spot appear where we know there shouldn't be one. In the alternate universes, the laser spot doesn't appear. It could be said that when we don't see the spots appear out of nowhere, they do appear in another universe but caution should be applied here because it is yet to be shown exactly what causes the laser spot to appear in relation to the fan acting like a shutter. When we don't see this phenomena here, it might just mean the right trigger hadn't been reached in terms of the fan blade suddenly appearing behind a laser burst. In any case, this all occurs because in these, and other so-called retrocausality experiments, the "omniverse" keeps track of everything that's going on and when something occurs that meets its requirement for a "spooky" response, it *gives us one*.

When the laser spot appears at the end of the direction of the beam, I surmise that a fan blade has appeared at some distance in front of the laser burst to cause the universe to decohere and present a new one where the beam quantum tunneled past the fan blade. As Seth Lloyd said, the universe (I'm saying ominverse) acts like a giant computer processing the information within [17], but that doesn't mean the omniverse is itself a simulation despite what Nick Bostrom [18] posits concerning the simulation theory idea - that we're living in a simulation created by our descendants from a far distant future. There is no evidence for it. What the theory presupposes is that for some reason - yet to be explained, our post-human descendants, untold years from now, will want to make realistic virtual simulations of their distant ancestors' history, ignoring the very obvious ability, that they should have by then, to time travel and experience the *real thing*. Instead, they'll want to spend all that time to create a massive computer simulation that would either have to run for billions of years to create everything that we know so far, or have the super massive capability to create space and time - as we know it - through some other quicker method, yet to be mentioned. Although I can imagine how it could be done, it would be difficult and require digitalcentrism to survive on a scale I find ridiculous, to paraphrase Linda Randall [19] during the 2016 Isaac Asimov Memorial Debate [20] event on simulation theory. Only those, whose main experience with technology has been through computers,

would posit such an absurdity - their digitalcentrism, or the bias to view things through the sole orientation of computer engineering or programming - as it's become known since the late 20th century, totally blinding them to otherwise obvious alternative possibilities.

The Rachel and Emily Retrocausality experiments are the only laser based experiments so far to show radical new perspectives of the nature of the universe. The attempts to detect quantum jitter, that may indicate that the universe is also a hologram, have so far proved unsuccessful [21]. Now, there is not one shred of evidence for a simulated universe - but there are experiments to support an information based omniverse and, to escape reality as we know it - as certain unnamed Silicon Valley billionaires [22] are rumored to be wanting to, the solution is the accomplishment of time travel which would open the entire omniverse to access, *on demand*. On December 9, 2016 the Rachel and Emily experiments, as well as an escape solution, were revealed at a WakeUp StartUp event [23], stunning the tech savvy entrepreneurs there who look up to the Silicon Valley elites. The results of the Rachel and Emily retroworldality experiments point towards the undeniable fact that when addressed with the correct technological prompts, the omniverse *will* respond.

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