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RESEARCH ARTICLE

Advances in Double Slit Experiment with Theoretical Implications

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Abstract

This paper describes three new double slit experiments that challenge the concept of non-locality and other related concepts. The first experiment limits the core photon path to one slit at the double slit. This prevents the destruction or disabling of the broader wave or field by post exit, which way, detection methods in prior experiments. This allows the generation of a double slit interference pattern even when the path is known. It has been demonstrated that opposite polarity can prevent interference even when it is not a path determinate [1]; however, this and other disrupters is the method of determining path determination in existing single photon experiments [2]. This first experiment is more in alignment with the less favored David Bohm interpretation [3] than those of Neils Bohr and Albert Einstein. In the second experiment the convergence of the two possible paths is delayed. This prevents the occurrence of a double slit pattern after the photon has reconstituted from the disruption from encountering the slit edges. The third experiment, confirms the implications of the first and second experiments. Together these experiments seem to indicate that the core photon is a complex system that generates a broader field or wave that can interact with the core photon to govern the trajectory; but, can only do so when the core photon is recovering from partial disruption and the relative polarity and alignment has not been altered.

1. New Dark Edge Double Slit Experiment

In this experiment light is first sent through a 0.50mm slit creating a single slit pattern. Next at 4.46m farther [a minimum distance of 4m may be required to allow a broader wave to reconstitute] a double slit separated by a 2.10mm spacer, is placed so that the left slit is dark and within the second anti-nodal while the right slit allows light from the second nodal to pass inside of, and free of, the slit edges. There is an absence of any additional interference pattern. When the double slit is slightly repositioned so that the left slit remains dark and the edges of the right slit are illuminated a double slit pattern emerges at the target. If a shield is then placed in front of the left slit the interference pattern changes to a single slit pattern. If the shield is moved from the dark slit to the illuminated slit there is an absence of any light reaching the target screen. This seems to indicate that the photon generates a broader field that can alter the path of the photon but only when the photon is reconfiguring after being disrupted by a physical edge. (figure 1)

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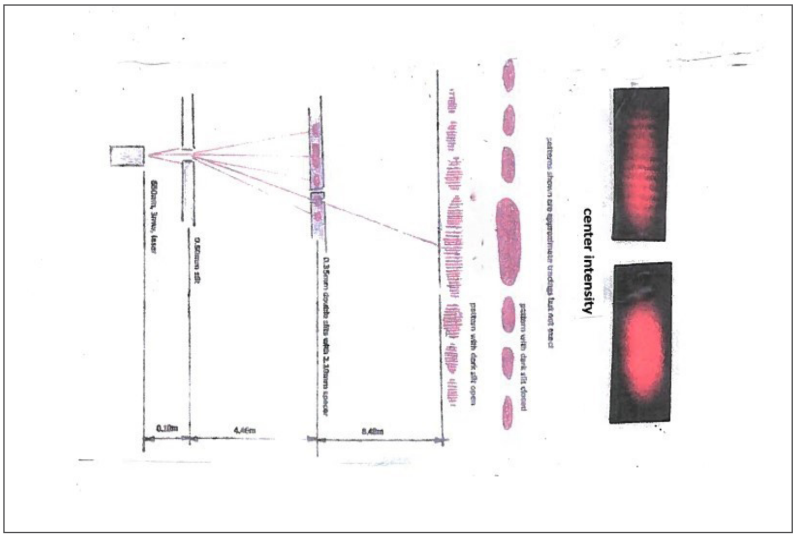

Figure 1. *Dark Edge Double Slit Experiment*

2. New Delayed Convergence Double Slit Experiment

In this experiment light from a laser is sent to a beam splitter. Then, front surfaced mirrors direct the two beams into widely separated parallel paths, or rather a widely separated path for photons of each path and their associated broader field or wave. Next, another group of mirrors direct the light into close, nearly parallel, crossing paths, for 11.4m to the target screen. Finally single slits are placed in the two paths close to the beam splitter and 4.8m prior to the second set of mirrors. This results in single slit interference patterns at the target screen; but an absence of any double slit interference. For a control demonstration the single slits were repositioned close to the second group of mirrors. Without moving anything else, including the mirrors, a double slit interference was then produced. This seems to confirm that the broader wave can only influence the path of the photon in the near field, before it has reconfigured. (figure2)

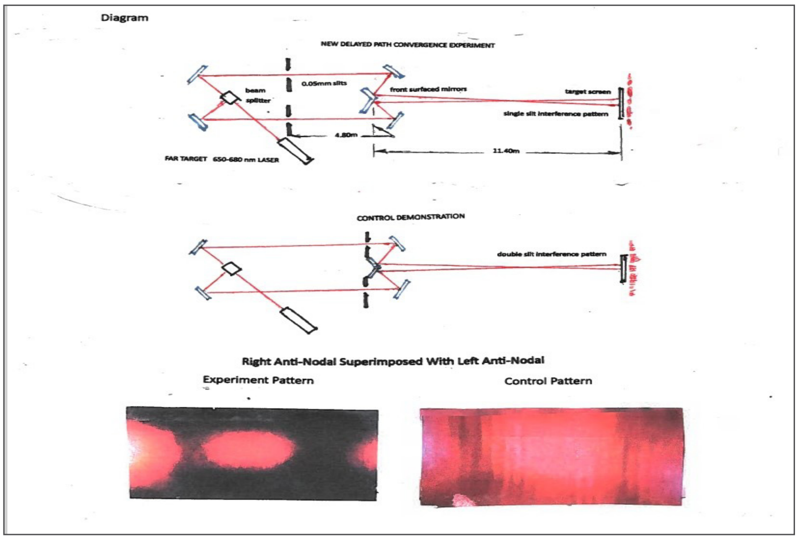

Figure 2. *Delayed Convergence Double Slit*

3. New Narrow Angle Double Slit Experiment

In this experiment light from a 653-680nm laser passes through a non-polarizing beam splitter and then after being sent in different directions is brought back into nearly parallel paths by front silvered mirrors. Next each of the two paths pass through different 0.75mm slits separated by a 6.00mm spacer. Initially each of the paths is set to convergence at 0.234m at an angle of 1^0-39’-08”. After an additional 12.136m they encounter the target screen where they form two interference patterns with the center anti-nodal, or center maxima, separated by 0.35m with 25 single slit spaced anti-nodal bands of light between them and double slit spacing in the peripheral bands. When the paths are re-configured not to intersect but at an angle of 1^0-35’-08” to go on a direct line to the same center points on the screen; there is an absence of double slit spacing even though the separating angle is smaller. In both cases the light reaches the screen with the same 0.350 separation after traveling the same distance. It seems that it is only the inside portion of interference single slit patterns interfere early enough to form a double slit pattern before the center path intersection and then display as the outside portion after the intersection. Whereas, the delayed early convergence of those same patterns at the screen fail to produce an interference pattern. The obvious which way path for the photons and the required early interference supports the results of the other accompanying experiments. (figure 3)

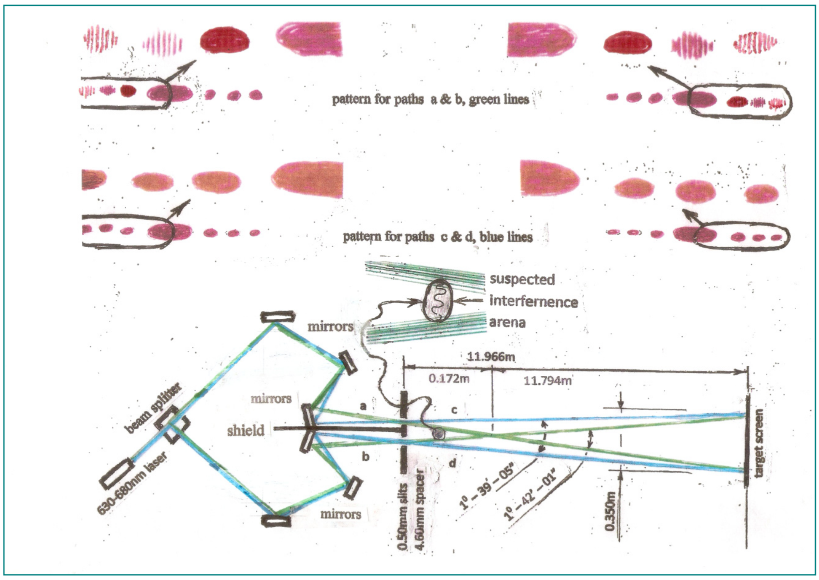

Figure 3. *Narrow Angle Double Slit*

4. Conclusion

These new variations on the double slit experiment seem to indicate that the photon is a complex system that produces a broader wave, or field, that can influence the photon path but only when the core photon has been temporarily disrupted. Demonstrating that the photon is an active physical system may also have far-reaching theoretical implications beyond those of these specific experiments.

5. References

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