The uncertainty principle and quantized space-time

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Abstract

This paper will show that the Heisenberg uncertainty principle can be explained through quantized space-time. This idea will be developed from the double slit delayed choice quantum eraser experiment and gravitational waves.

Introduction

The delayed choice quantum electro-optical eraser experiment (1) proves that particles (or photons) that pass through the detection path will generate a noninterference pattern, while those who will pass through the detection path and later on through the electro-optical eraser (quantum eraser) path will generate an interference pattern (figure 1). The noninterference pattern means that the particle (or photon) passed through one slit only. The interference pattern means that the particle (or photon) passed through both slits. Since the quantum eraser can be applied at the final stages, just before measuring its final location of the particle (or photon) on the screen, we can conclude that the which path (which slit) information dictates if it passed through only one, or through both slits. The paradox is that the particle generates gravitational waves (2) that should reveal the which path/which slit information regardless of the quantum eraser detection setup. How can the quantum eraser setup erase the which path/which slit information due to the gravitational waves?

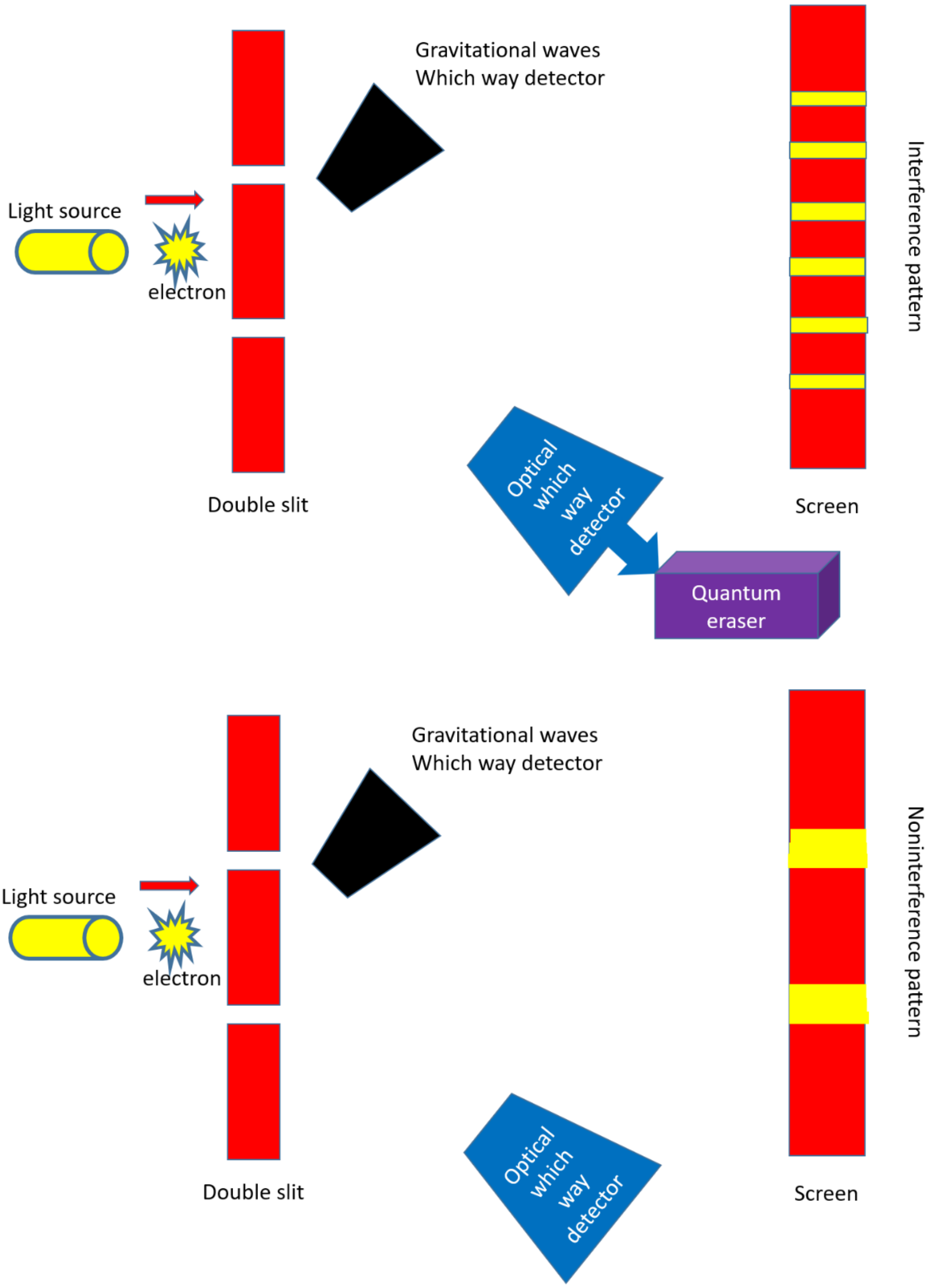
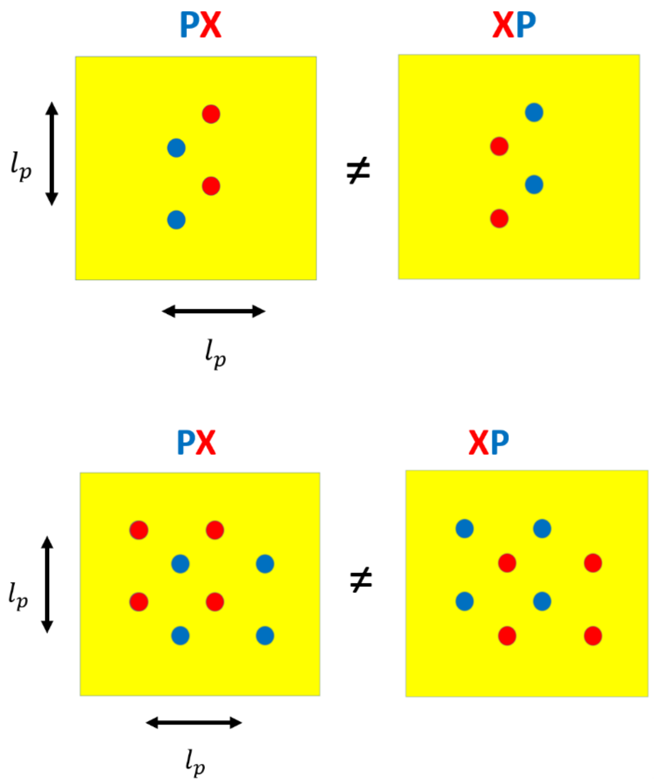


Figure 1: The top image illustrates the interference pattern in a double slit experiment due to the quantum eraser and the bottom image illustrates the non-interference pattern without the quantum eraser. The paradox is that the pattern is influenced only by the erasing phase of the optical (or electro-optical) which way (which slit) detector without any consideration regarding the gravitational waves which way (which slit) detector. In this setup only one particle comes at a time through only one set of double slits but in theory there could be endless sets of double slits next to each other bombarded by an energetic stream of particles (or photons) to avoid the doubt that gravitational waves should be generated during the procedure.

Conclusion

The delayed choice quantum eraser experiment proves that until we measure the final non-erasable information regarding the momentum and or location of the particle (or photon) there are no gravitational waves, meaning that only the actual non-erasable measurement process generates information that vibrate the fabric of space-time and can be detected by gravitational waves detector. That means that the particle had no real existence in the fabric of space-time until its final non-erasable momentum or position measurement. Where was it all that time? In the quantum scale there are two distinct measurements that generate data and ripples in space time. These two measurements are position and momentum of the particle (or photon). Based on the Heisenberg uncertainty principle (3), these two measurements do not commute, meaning $PX - XP \geq h$, where P is momentum, X is position and h is Planck's constant. The more you know about X, P or both, the less they commute and the uncertainty increases. This leads to the idea that space-time is quantized into discrete space-time units (probably in the size order of Planck length and Plack time) where each unit can contain only one bit of information regarding position or momentum. These space units are filled in a specific energetic order (similar for example to the electrons that fill the surrounding shell in a specific energetic structure). So as illustrated in figure 2, if P is measured first, the order in which these quantum units are filled is different than if X is measured first. That is why they do not commute and that leads to Heisenberg's uncertainty principle. The more you try to measure P and X, the more you fill in the quantum units in two different ways depending on the order of measurement, and the uncertainty increases.



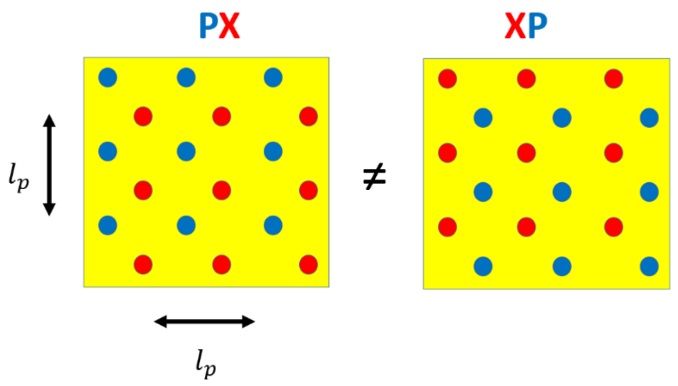


Figure 2: The blue dots represent quantized information units of momentum (P) while the red dots represent quantized information units of position (X). They are in the expected size of Planck length (and Planck time but the illustration in figure 2 is at a specific moment in time so it relates only to space). They exist as ripples in spacetime only after they are measured in a non-erasable setup. The more information you measure on P or X the less they commute. This can be seen in the three images above, the top image with the least information commutes more than the bottom image with the most information. The yellow background represents an unavoidable extra nonlocal space-time dimension dividing our standard known space-time into quantized units of information bits and due to its grid shape can be referred to as the grid dimension. This extra nonlocal dimension which connects all the local quantized information bits together, can explain the non-local quantum "spooky" behavior, like quantum tunneling, quantum entanglement, Feynman path integral formulation, Schrodinger's wave function collapse etc. It enables to visualize multi layers of staggered quantum worlds or frames of reference, floating next to each other in the grid dimension like the many worlds interpretation of quantum mechanics or even the universal speed of light behavior of Einstein's special theory of relativity for each frame of reference (light communicates all the quantized staggered frames of reference through the grid dimension). The grid dimension can be the "ether" or even the Higgs field.

REFERENCES:

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