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The Double Slit Experiment Necessitates a Reformulation of Electromagnetic Waves Including A New Form of Coupling

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ABSTRACT. The classic model of electromagnetic waves is illustrated and shown to be inadequate to explain the well-established results of the double slit experiment. A new formulation of electromagnetic waves is developed along with a new mechanism of wave coupling. This new perspective provides the necessary dynamics for the classic interference pattern of the double slit experiment.

The classic double slit experiment gives us the familiar interference pattern because of the different lengths that interfering waves take, leading to constructive and destructive interference. However, a careful examination leads to a new necessity to explain the results of this vital experiment.

The electric and magnetic components will not overlap each other if they hit different parts of one of the subatomic particles the detector screen is composed of.

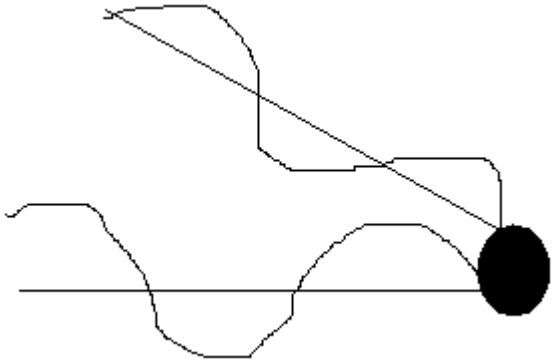

Figure 1: This is a top-down view with only the magnetic oscillations showing (the electric components oscillate up and down). The dot is a subatomic particle that is part of the detector screen. As you can see, the magnetic and electric oscillations of the waves are prevented from touching each other. Therefore, they can not interfere.

This would happen so often that the dark regions of the interference pattern would have a lot of brightness distributed through them due to less destructive interference. Also, the bright regions would not be as bright due to less constructive interference.

You may say that the waves are infinitesimally close to each other, but that would create huge amounts of constructive interference, making the bright spots on the detector screen blinding. Also, infinitesimal spacing of waves would require infinite energy. Therefore, the individual waves, when a photon is emitted, must be spaced by at least their amplitude.

So how is this puzzle solved? There must be a **thickness** to the wave oscillations. With thickness, the oscillations on different parts of a subatomic particle could touch. So the waves look like this:

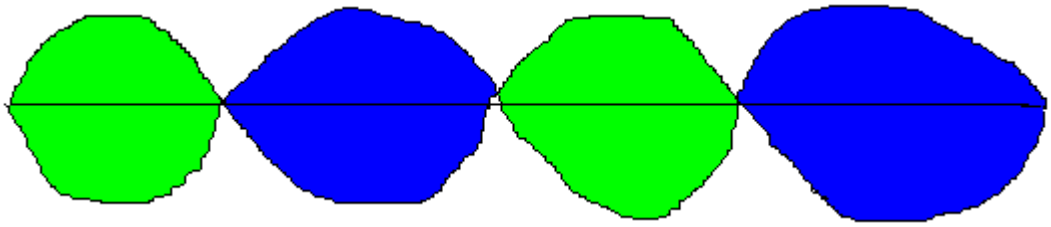

Figure 2: This is a top-down view of a wave. The blue is the electric component and the green is the magnetic component. Each forms a half quasi-spherical shape and they switch positions with every oscillation.

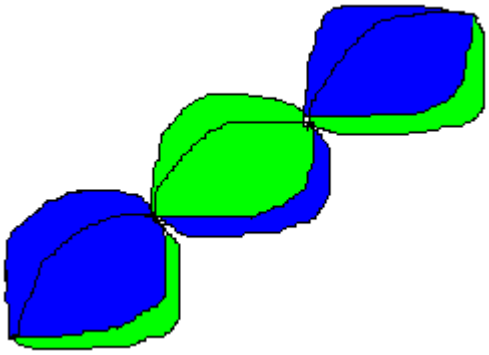

Figure 3: This is a top-down but with perspective view of the wave. You can see the half quasi-spherical shapes better.

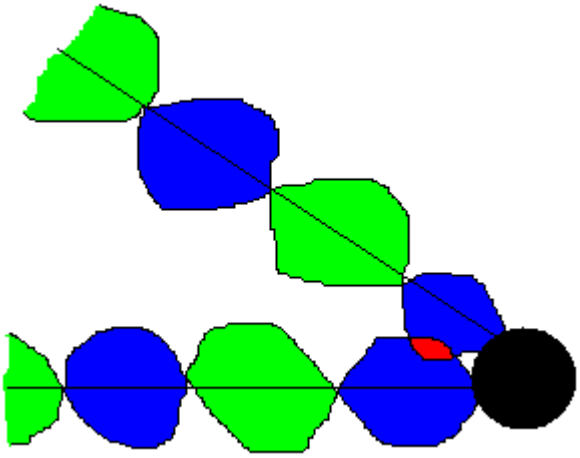

Figure 4: This figure is like Figure 1 except we have the thicknesses to the electric and magnetic components of the two waves that are hitting one of the subatomic particles the detector screen is composed of. The red region is where they touch and causes coupling of the two waves.

On both sides of oscillating waves, there must be an energy that causes them to couple with any other wave that has the coupling energy and touches. When coupling occurs, the two or more waves snap together so that their electric and magnetic field components are perfectly aligned with each other, causing constructive or destructive interference. Then, the waves go on on their separate ways (the directions they were initially traveling in). This would happen many times to the waves when they are in between the slits and detector screen. When coupling happens and the waves are absorbed by the detector screen while they are coupled, the familiar interference pattern we know so well is produced. If there was no coupling, then the interference pattern would have many places of otherwise unexplained brightness, on the sides of parts of the detector screen's surface. Remember, the number of waves produced from a photon can not be infinite and be everywhere. Since there is spacing, there is not always a wave an infinitesimal distance away with which to interfere. This leads to the need for

coupling because of the distribution of light and dark in the interference pattern we know so well.

This paper considers electromagnetic waves from a classical point of view. However, even if wavefunctions are used, the same points are raised and lead to the same conclusions.