RESEARCH ARTICLE

A Proof that Diffraction Grating Experimental Wavelength Conclusions are in Error

Donald C. Aucamp, ScD

Professor Emeritus, Southern Illinois University at Edwardsville, USA.

Corresponding Authors: Donald C. Aucamp, ScD, Professor Emeritus, Southern Illinois University at Edwardsville, USA.

Abstract

Photons have been shown in this author's prior papers to be spinning, washer shaped, atomic sized particles which are single electric field corpuscles that move orthogonally to the washer face at the local speed of light. Thus, light has no frequency and is not a wave. Perhaps one of the major arguments in favor of light being a wave is that diffraction grating experiments accurately identify the source of the emitted photons. A fundamental assumption in the analysis involving these experiments is that the incident light at the grating slits is a coherent wave. It will be shown in this work that this assumption cannot be valid. However, in spite of this result, and in spite of light being particle shaped and not a wave, it is briefly outlined in this work and shown in an upcoming paper that the conclusions which are drawn concerning source identities are correct. Thus, these spectroscopy experiments have great value even though the wavelengths they indicate do not exist.

1. Introduction

Photons have been shown in [1-5] to be spinning, atomic sized, single electric field corpuscles in the shape of very thin rings (herein called washers) which move at the local velocity of light in a direction that is orthogonal to the washer face. Strong support of [1-5] lies in the fact that it leads to irrefutable formulas for Planck's constant, the photoelectric effect, and the structure of the periodic table. It is noted that photons have generally been assumed to be waves, except when certain experiments indicate they are particles. This problem has given rise to what is known as the wave-particle paradox, an enigma which has been unresolved for a very long time, but will be resolved in an upcoming paper.

Arguably, two major reasons in favor of the wave hypothesis are the appearance of essentially linear fringe patterns in diffraction grating experiments and the fact that they unerringly identify emission sources. While these two properties will be resolved in an upcoming work, the short answer to them is that the experimentally measured wavelengths are actually the lengths of the photon particles after they exit the grating, which differ from the lengths when they enter it. As these lengths uniquely depend on the sources, diffraction grating experiments accurately identify them.

The objective of this particular work is to show that the fundamental assumption in the wavelength analysis in diffraction grating experiments is in error, so that these experiments do not in fact measure the nonexistent wavelengths. In addition, several other factors are also considered which further confirm the thesis that light is not a wave.

2. Background Theory

The background theory employed in this work is developed by Bohr[6] and this author in [1-5]. In the latter papers an alternate form of the atom is introduced and studied, where the results show how photons are created, and also that they are atomic sized particles which are electric field corpuscles. Several corroborating features of these works are the development of formulas for Planck's constant and

the photoelectric effect, as well as the determination of the structure of the periodic table.

3. Diffraction Grating Analysis

In 1801 Thomas Young experimentally demonstrated that light is apparently a wave. In a modern day version of his work a diffraction grating is often used. Though there are several kinds, attention is directed to those that transmit photons through linear, parallel slits. In these experiments a special filter is often used to achieve greater photon emission purity. These emissions then hit a diffraction grating, where it will be shown in an upcoming paper that they are altered before they emerge from it. Subsequently, they get extinguished by hitting a screen which is placed moderately far away, at least as compared to the average distance D between the slits. A top view of the diffraction grating experiment is shown in Figure 1 below for those cases in which some of the emanations from the slits happen to be at roughly a fixed angle θ as measured with respect to the orthogonal line from the slit to the screen. It is seen the movements for this θ are all shown as being parallel straight lines.
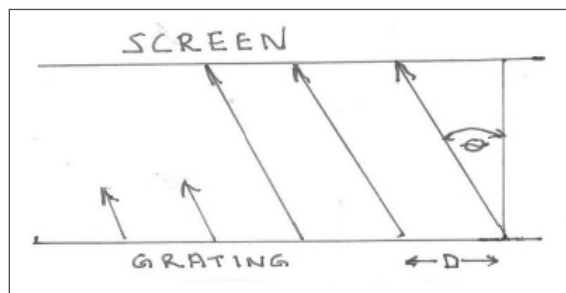

Figure 1. *Top View of Diffraction Gratig*

When there are only a few emissions the experiments result in separate points on the screen. However, when there are many emissions, essentially straight line fringe patterns appear. Given that photon shapes are particles, it is easy to explain why the outcomes are points when only a few of them impinge on the grating. However, it is not clear why linear fringe patterns develop when there are many arrivals. The standard analysis explaining these linear patterns is based on the assumption that the individual photons escaping from the slits are coherent wavelets of a fundamental wavelength, λ. What is important is that the analysis totally depends on the coherence assumption, which will now be shown to be invalid.

4. Problem with the Coherence Assumption

For a given fundamental wavelength of λ it is assumed in the standard analysis that this wave exits in identical coherent wavelets from all the slits. Thus, if the width of the diffraction grating shown in the figure is W, then the coherence assumption requires the following.

$$\lambda \gg W \qquad (4.1)$$

Accordingly, it is required that:

$$\lambda / W \gg 1 \qquad (4.2)$$

It will be shown that (4.2) is generally not close to being satisfied, and in fact the actual relation between λ and W is more closely given as $\lambda/W \ll 1$.

First, it is assumed from actual experiments that, roughly.

$$\lambda \approx 500 \text{ nm} = 500 \times 10^{-9} \text{ m} \qquad (4.3)$$

Second, it is assumed that W is measured in cm, and that, roughly.

$$W \approx 1 \text{ cm} = .01 \text{ m} \qquad (4.4)$$

Based on these approximations, the following is attained.

$$\lambda / W \approx 500 \times 10^{-9} / .01 = 5 \times 10^{-5} \qquad (4.5)$$

From this result it is clear that the requirement given by (4.2) is not in any way close to being met. Also, it is further argued that any reasonable variations of these assumed approximate values will still result in a complete failure of the coherence requirement.

It is therefore concluded that the calculated wavelengths of diffraction grating experiments are meaningless, and as a result they do not prove that photons are waves. However, in spite of this problem, it will be shown in an upcoming paper that the λ calculations are uniquely dependent on the sources, so that the conclusions concerning source identities are generally correct.

5. Several other Arguments against Photon Waves

1. The photon washers proposed in [1-5] lead to irrefutable formulas for Planck's constant, the

photoelectric effect, and the structure of the periodic table. Thus, these results tend to indicate that the particle theory proposed there is correct.

2. The term, "wave", refers to something which has a frequency. Thus, an argument against the wave theory of light is that frequencies are never directly measured.

3. The standard wave theory of light does not resolve the wave-particle paradox. This paradox will be resolved in this author's upcoming paper.

4. The whole concept of individual waves requires that each wave must attain a virtually infinite radius as t->∞, a wave which strangely must collapse instantaneously when it strikes something.

5. The modern theory of photons is extremely complicated and in need of quantum mechanics to resolve, which Nobel physicist Richard Feynman[7] has claimed nobody understands. Arguably, from Occam's Razor, why not accept a theory that is far simpler?

6. Conclusion

An analysis is presented in this work which shows that wavelength calculations in diffraction grating experiments are in error because the emanations that exit the slits cannot be coherent waves. While an explanation for the appearance of linear ridge lines and the correct identifications of the emanation sources in the case when there are many photon arrivals are briefly alluded to in this work, these features are resolved in a forthcoming paper.

7. Refrences

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