Report on the Evaluation of Chapter 8 in "The Grand Unified Theory of Classical Physics" by Dr. Randell L. Mills

Prepared by

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February 20, 2018
Revised December 3, 2018

Executive Summary

In my analysis, I verified calculations and the steps involved in deriving equations involving photon and electron scattering found in Chapter 8 of the book "The Grand Unified Theory of Classical Physics" by Dr. Randell L. Mills. There were no tables or values to verify in Chapter 8. In the course of these calculations, I replicated the CP results to an excellent degree of accuracy.

Purpose

In Chapter 8, the far field solution to a spherical wave is determined. After this comes a discussion of the Dirac Delta Function, which is a useful concept for this chapter. Next, the array theorem is discussed. The array theorem arises from the study of the combined diffraction patterns of an array of similar-looking diffraction apertures. From this theorem, we see that the Fraunhofer pattern that results is just the Fourier transform of the aperture distribution. The array theorem states that the diffraction pattern of an array of similar-looking apertures is given by the product of the elemental pattern and the pattern that would be obtained by a similar array of point sources. This allows one to analyze separately the effects of the array from the effects of the individual apertures.

Next, the array theorem is applied to the two-slit interference experiments involving both photons and electrons. Dr. Mills asserts that the wave-particle duality of both electrons and photons arises classically. The diffraction pattern and the intensity of the two-slit experiment are derived. It is pointed out that the distribution pattern observed using diffracting electrons is exactly equivalent to the distribution pattern observed using diffracting photons.

CP describes the interaction of the electron with two slits (electron diffraction) as one where the extended particle interacts with both slits, where momentum is conserved. The initially unpolarized electron becomes polarized by image charges in the slits in order to minimize the energy of interaction with the slit. The interaction with the slit can cause a momentum transfer to the transverse direction. This process is mediated by photons, where each photon provides a torque to change the angular momentum vector. This momentum transfer from the z-axis to the transverse or x-axis in the far field depends on the strength and the time duration of the photon-generated torque. Hence, the interference pattern is a map of the momentum density, without any need to resort to a discussion of constructive and destructive interference of probability waves as is typically seen in standard quantum mechanics. The photon far-field pattern is imprinted on the electron beam pattern over time.

Next the classical wave theory of electron scattering resulting from CP is developed. The case of a plane wave scattered by an atom is investigated, where the plane wave is scattered by a nucleus and electrons which act as an ensemble of scattering sites. Also investigated is high-energy electron scattering and X-ray scattering from gas atoms.

Finally an electron scattering equation for the Helium atom based on the atomic orbital model of Chapter 7 is developed. Experimental results for the elastic scattering of electrons off of helium atoms are presented along with modified quantum mechanical calculations. These calculations fail to predict the experimental results at small scattering angles. However the CP theory predicts the correct behavior at small scattering angles, in line with the experimental results. It is pointed out that the Born interpretation must be rejected since it is only valid if the speed of the electron is equal to infinity. It must be rejected since the electron velocity cannot exceed c without violating special relativity. Dr. Mills states that “The failure of the Born and Schrodinger model of the electron to provide a consistent representation of the states of the electron from a bound state to an ionized state to a scattered state also represents a failure of the dependent Heisenberg Uncertainty Principle.”

In contrast the Maxwellian exact atomic orbital model does provide a continuous representation of all the states of the electron from bound state to ionized state to scattered state. Single-slit and double-slit distribution patterns are derived. The double-slit experiment can be modeled classically using CP and a computer simulation of such is posted on the Brilliant Light Power website. This computer simulation is discussed at the end of Chapter 8 using diagrams showing an electron being diffracted by slits. It correctly produces the familiar pattern of bright and dark fringes associated with electron diffraction.

Calculation

I have verified that Eqs. 8.1 through 8.10 are indeed true.

I have verified Eq. 8.12 and 8.14.

I have verified Eqs. 8.16-8.25 and find them to be true and correct.

In the bottom line of page 271, I verified the plane travelling wave equation.

In the top line of page 272, I verified the formula for k.

In the 7^{th} and 8^{th} line of page 272, I have verified the equations in these lines.

I have verified the calculation of $(m_p)^2/(m_e)^2$ given two lines before Eq. 8.28 and find it to be correct.

I have verified Eq. 8.40, as well as Eqs. 8.48 – 8.49.

I have verified the value in the line before Eqn. 8.45.

I verified the value given in Eq. 8.44 (it comes from Table 7.1).

I have verified Eqs. 8.52, 8.57, and 8.59-8.61.

Conclusion

I was able to verify the CP results of Chapter 8 in excellent agreement with my own calculations and equations. I was able to replicate the derivation of Dr. Mills' equations to an excellent degree of accuracy. I find this to be confirmation that the calculations included in Chapter 8 are indeed valid and reproducible.