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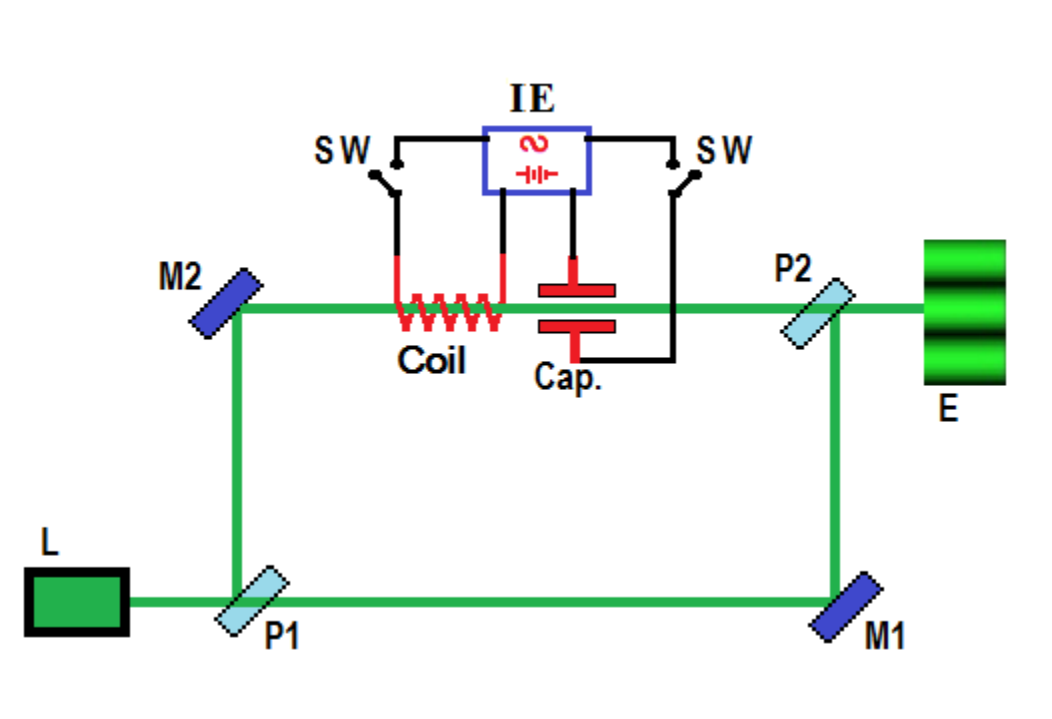


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# On the duality of quantum particles and the Copenhagen interpretation of quantum mechanics

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**Abstract.**
In this article, we will examine experiments that prove that light, photons most commonly referred to by the abbreviation EMW (Electromagnetic Waves), are in fact completely electro-magnetically neutral. We will prove that EMWs do not interact with real Coulomb and magnetic fields. Accordingly, the electrical and magnetic effects that we observe and measure, such as in the cases of Pokels cells, Kerr cells, or the liquid crystals under consideration, are not caused by EMWs. In fact, they are a consequence of a secondary effect from the intermediate substance through which EMWs pass, a substance that has been affected by magnetic and Coulomb fields.

**Keywords:** EMW, light, photons, interference pattern, quantum particles

**Contents**


**Abbreviations:**
CI - Copenhagen Interpretation
QPM - Quantum Particle with Mass
EMW - Electromagnetic Waves
IP - Interference Pattern

## 1. Introduction

The contemporary paradigm of the duality of quantum particles, imposed in the 1920s by supporters of the Copenhagen Interpretation (CI), is accepted as a proven fact, which serves as a starting point for the consideration of Quantum Mechanics as a whole. It is assumed that duality is a property of both Quantum Particles with Mass (QPM) at rest and photons, which for convenience we will refer to as Electromagnetic Waves (EMW). However, the duality of

# 3. Conclusions

From the analysis of the experiments that can be performed on the interferometer in Fig. 1. As well as on an interferometer with QPM (see [5], which interferometer we have modified and use in the discussion). We can draw the following conclusions:

1. EMW (photons, light) are electrically and magnetically neutral; they do not interact with the magnetic and electric fields of the coil and capacitor shown in Fig. 1, so there is no change in IP.

2. QPM (e.g. electrons) interact with the electric and magnetic fields of the coil and capacitor shown, so there is a change in IP.

**Therefore, EMW and QPM obey different laws, e.g , and the receipt and observation of IP.**

From this we can draw one of the main conclusions. **We cannot replace an experiment considered with QPM, as in Einstein, Podolsky, Rosen in [3], with an optical experiment using EMW, as considered by Alain Aspect in [7].** Because they obey different laws.

Accordingly, the author's stated claim in [7], point ***2.1. Experiment scheme***:

*"Note: There is a mutually unambiguous correspondence between the scheme of the thought EPR experiment according to Bohm and the experiment with two particles with spin ½ in an entangled state, which are subjected to analysis using Stern-Gerlach filters with two orientations."*

This is incorrect and contradicts the experiments discussed above and the conclusions drawn.

It should be noted that the author in [7], declares full correspondence between experiments with QPM (according to EPR) and an optical experiment using EMW, referring to D. Bohm and J. Bell. However, this reference does not have the force of experimental fact, but is only a way of complicating the case and blurring the essence. In literature [8], information can be found on the chronology of the case in question.

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