RESEARCH

# Are matter waves longitudinal photons?

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## ABSTRACT

Longitudinal photons acquire mass. They cause a space-time curvature and would be said to be waves of compression of the volume. This would explain the previous research of the author. In this research, mass alters the speed of light and causes a space-time curvature, creating the volume that surrounds the point particle. Following the discovery of the Higgs boson, there is a growing consensus among researchers that the exploration of matter waves in the context of longitudinal photons holds significant potential. This emerging trend in research suggests that a promising pathway has been paved toward comprehending matter waves through the framework of longitudinal photons.


**Key Words:** *Superconductivity, Higgs boson, Hidden variables*

## INTRODUCTION

Our theory has explained London equations of superconductivity based on the assumption that we live in a fluid space-time and the quantities transform accordingly [1]. The incorporation of Dirac matrices enables the association of a photon's spin with both its particle-like and wave-like characteristics. It is intriguing to discover that when the photon possesses mass, it can exhibit non-zero electric and magnetic fields. This set of equations can be derived from Dirac relativistic equation [2-5]. They also explain superconductivity.

### Explanation of the main part

From the author's previous research, space-time becomes distorted by the mass and depends on the solid angle of the observer. Since the solid angles are periodical with period 4π space-time becomes cyclic [3]:

$$\Omega = \frac{(mc^2 \tau)}{h} \qquad (1)$$

The volume depends exponentially on the space-time and therefore it is vibrating:

$$V = Ne^{-mc^2 \tau / h} \qquad (2)$$

We support these waves of volume compression and rarefaction as longitudinal electromagnetic waves.

Oppositely to what one might believe it is not the magnetic and electric field but the magnetization and polarization which play a vital role in creating this volume dilation. Forward we present these equations that govern these fields as mentioned by Arbab [4]:

$$\nabla \times \vec{P} = \frac{d\vec{r}}{dt} \times \frac{d\vec{F}}{dV} = \frac{1}{c^2}\frac{\partial \vec{M}}{\partial t} = \frac{d\vec{r}}{dt} \times \frac{\partial \vec{P}}{\partial t} \qquad (3)$$

From equation (4) we deduce that the longitudinal photon is created in the case of time-varying probability and this happens when a photon is absorbed by the atom.

$$\nabla \times \vec{M} + \frac{\partial \vec{P}}{\partial t} = \alpha \nabla \Lambda \qquad (4)$$

We have good reasons to believe that the gauge Λ appearing in equation (4) is connected to Gibbs thermodynamic potential Omega:

$$\Omega = -PV \qquad (5)$$

The longitudinal photon created is primarily a longitudinal wave of polarization and magnetization:

$$\nabla^2 \vec{P} = \frac{1}{c^2}\frac{\partial^2 \vec{P}}{\partial t^2} \qquad (6)$$

### Aim to study matter waves and longitudinal photons

The study of matter waves and longitudinal photons aims to investigate the relationship and potential connections between these two phenomena. One hypothesis proposes that matter waves could be explained in terms of longitudinal photons.

This hypothesis suggests that the underlying mechanism responsible for the wave-particle duality observed in quantum systems could be rooted in the behavior of longitudinal photons [6].

By exploring this idea, researchers seek to elucidate whether matter waves can be fundamentally understood and described in terms of the characteristics and dynamics of longitudinal photons.

Based on Maxwell's theory, the motion of a charged particle generates electric and magnetic fields, which manifest as waves. These waves are

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characterized by their transverse nature, meaning that the electric and magnetic fields are perpendicular to each other and to the direction of wave propagation [6].

## CONCLUSION

We agree with the modern trend of research after the observation of the Higgs boson that the road is open for the explanation of matter waves in terms of longitudinal photons. While a massless photon has electric and magnetic fields that vanish, massive photons can possess non-zero electric and magnetic fields.

This is due to the presence of mass, which leads to the emergence of electric and magnetic currents. However, it is important to note that the electromagnetic force density on photons always vanishes identically.

We have not explained the gauge Λ fully. It is possible that it is related to the thermodynamic potential Omega or the dielectric susceptibility chi. we hope that there will be a continuation in this line of investigation

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