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Chapter 5, Part B-Propagation Geometry and Propagation Character- Two Issues or One Issue?

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Abstract: There are two questions dealing with light: 1) what does it travel isotropic to? (answers: ballistic theory; ether theory) and 2) what is its character? (answers: corpuscle; wave). Currently the scientific community automatically links the ballistic theory with the corpuscular hypothesis and the ether theory the wave hypothesis. These associations stem from analogy to mechanical situations. This paper considers the justification of relying on mechanical situations to carry over associations to the electrodynamic context. This paper presumes the reader has already read my papers on "A Brief Overview of SRT" and "Light Isotropy: Theory and Experiment".

Contents:

1. Introduction

In the 1860's it became known that light travels through empty space even on a microscopic level (between charges). Two questions are begged: When light travels through empty space, what is its- 1) propagation geometry", 2) propagation character? These two questions can be rephrased, respectively, as follows: When light travels through empty space, 1) what does it travel isotropic with respect to? The source jiggled charge (Ballistic Theory); The ether (The Isotropic Ether Theory); and 2) What is the character of light? Corpuscle (Corpuscular Hypothesis); Wave (Wave Hypothesis).

The ballistic theory is commonly associated with the corpuscular hypothesis, while the ether theory is commonly associated with the ether hypothesis. This paper explores whether or not such associations are warranted. It is found that such associations are not necessary.

2. Theory Options

The ballistic theory is commonly linked to/associated with the corpuscular hypothesis. The ether theory is commonly linked to/associated with the wave hypothesis. Hence, theories of light propagation remain are restrained to two types: 1) ballistic/corpuscle, and 2) ether/wave.

If, however, we permit the freedom of choosing to identify propagation geometry independently of ones choice of propagation character, four types of theories are allowed.: 1) Ballistic/corpuscle, 2)ether wave, 3) ballistic wave, and 4) ether corpuscle.

3. Independent Experiments

Experiments, themselves, are categorized into two types: 1) Experiments designed to test light isotropy/propagation geometry, and 2) experiments designed to test light character. In order to be permitted to evaluate the experiments independently, on must receive the freedom to make any one of the four interpretations previously mentioned.

Experiments of each type even seem to provide us with conflicting interpretations. It therefore remains difficult to pick a theory of any one of the four types mentioned. Dismissal of two of these options only makes it more difficult. This provides us with an impetus for taking a critical eye in examining what is the reason behind such a restraint.

4. Translation of Associations from Mechanics to Electrodynamics

The restraint is placed because there is an automatic association between the ballistic theory and the corpuscular hypothesis and between the ether theory and the wave hypothesis. But why are these associations made? And what experimental evidence is there, if any, for making such associations?

The problem at hand is identifying the propagation geometry and propagation character of an electromagnetic field when this field travels through empty space.

Mechanics is familiar with a) masses traveling through empty space, and b) waves traveling through material mediums, but not fields traveling through empty space. One mechanical situation of type (a) is that of a tossed grenade explosion. If a grenade is tossed and explodes, the bits of shrapnel from the explosion will travel concentric in a frame glued to the motion of the source grenade. One mechanical situation of type (b) is that of a ripple of water. If you stick your finger in water, it will create a ripple that spreads outwards. This wave will travel isotropic to/concentric in a frame of reference glued to the motion of the water (the wave travels independent of the motion of the finger/source).

The associations (ballistic/corpuscle and ether/wave) are made for the electrodynamic situation. They stem from taking the associations inherent in the mechanical situations just discussed, and translating these associations from the mechanical case to the electrodynamic case.

The logic for case A is as follows: The ballistic theory presumes propagation geometry identical to the propagation geometry of the shrapnel bits from the source grenade. Since the propagation geometry is identical, it must also be the case that the propagation character is identical. The propagation character of the shrapnel bits is that of a corpuscle. It follows that the ballistic theory must presume a corpuscular character of the propagating field.

The logic for case B is as follows: the ether theory presumed a propagation geometry identical to the propagation geometry of the water ripples in the water medium. Since the propagation geometry is identical, it must also be the case that the propagation character is identical. The propagation character of the water ripples is that of a wave. It follows that the ether theory must presume a wave character of the propagating field.

5. Does Propagation Geometry imply Propagation Character?

The key ingredient in the above logic is the following statement: Since the propagation geometry is identical, it must also be the case that the propagation character is identical. In other words, propagation geometry implies propagation character. One must ask, when crossing over from the mechanical realm to the electrodynamic realm, is such an assertion warranted?

Should we be allowed to assume that what is true for mechanics is also true for electrodynamics? If the situations in the mechanical cases are identical to the situation in the electrodynamic case, then the answer to this question is yes. But if the situations in the mechanical cases are in any way different from the situation in the electrodynamic case, then the answer to the question is no.

In the case of the grenade, we have the situation of bits of mass traveling through empty space. In the case of the ripple of water, we have the situation of a wave traveling through a medium. But the electrodynamic situation can not be considered identical to either case. The electrodynamic situation, and the problem at hand, is that of an electromagnetic field traveling through empty space.

It is a field traveling through empty space-not a mass like shrapnel. It is empty space that the electromagnetic wave travels through-not a medium like water. An electromagnetic wave traveling through empty space should not be compared to either masses traveling through empty space or waves traveling through a medium.

The mechanical laws dictating the motion of masses and waves are very different from the electrodynamic laws dictating the motion of a field. We have no basis with which to assert that an electromagnetic field will behave like a mechanical mass or a mechanical wave.

6. Conclusion

The ballistic theory and ether theory emerged as attempts to answer the question, ‘With respect to what does light travel isotropic to, when it travels through empty space? The source (ballistic theory). The ether medium (ether theory). The ballistic theory is commonly necessarily linked with the wave character of light, while the ether theory is commonly necessarily linked with the wave character of light.. But does source isotropy

necessarily imply corpuscular character, and does medium isotropy necessarily imply wave character?

We find a situation in mechanics where something traveling with source isotropy has corpuscular character. We also find a situation in mechanics where something traveling with medium isotropy has wave character. But can we generalize and declare that propagation geometry implies propagation character? Can we say that the propagation geometry/propagation character linkages for mechanics must also carry over to electrodynamics?

In this paper, we determine t hat such a crossover is not warranted, because mechanics and electrodynamics obey different laws, and the situations are not comparable enough.

This gives rise to the ability to interpret light geometry/character in any one of the four ways (mentioned at the beginning of this paper), rather than two. This is very helpful, especially considering the fact that the experiments, themselves, sometimes suggest conflicting information concerning light geometry/light character.

7. Notes to Various Sections

7.1 Introduction-notes

Note 1: The Ballistic Theory is sometimes referred to as the Emitter Theory.

Note 2: There are two types of ether. One ether is presumed to exist to permit the propagation of electromagnetic waves in empty space, because it is believed that wave implies medium. This is the All-Pervading Ether theory and it is shown untenable in another paper, “Problems with the All Pervading Ether Hypothesis”. The other emerges simply as an answer to the question: What does light travel isotropic to when it travels through empty space? This type of ether theory, which could be a sea of photons (note wave nature of light not implicitly assumed), is called the Isotropic Ether Theory. It is the Isotropic Ether theory which will be dealt with in this paper.

Note 3: The question of importance to us is the question that SRT tries to answer, namely, ‘What is it that light travels isotropic to when it travels through empty space?’ The other question, ‘What is the character of light?’, needn’t be answered at this point. That second question actually is more closely related to quantum mechanics than it is to SRT.

7.2 Theory Options-notes

No notes.

7.3 Independent Experiments-notes

Note 1: There is conflicting experimental evidence over the propagation character of light. Phenomenon of interference suggests that light travels like a wave. The photoelectric effect suggests that light travels like a corpuscle. See Shamos.

There are a lot of experiments intended to identify the propagation geometry of light and they are all very confusing. There exist a host of interpretations available for any one given experiment. As such, it remains difficult to pick a theory of propagation geometry relating to any one experiment, let alone propose a coherent theory that agrees with all such experiments. Moreover, the interpretations that are available for one experiment seem to vary from the interpretations that are available for another experiment. In other words, the experiments seem to promote conflicting interpretations. See Kelly and Alford ("Light Isotropy: Theory and Experiment"; "Future Considerations-After SRT is Ruled Out").

7.4 Translation of Associations from Mechanics to Electrodynamics-notes

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Note 1: Note that we are here, in this paper, discussing reasons for the assertion that the ether theory must presume a wave character. In other words, ether implies wave. In another paper ('Problems with the All-Pervading Ether Hypothesis') I discuss reasons behind the assertion that the wave character of light must presume the hypothesis of the ether medium. In other words, wave implies ether. This is a subtle difference, but an important one, which isn't readily apparent from a rough consideration of the ether/wave association.

The reason why this difference is important is because in the two cases, the ether theory emerges from two entirely different reasons. In this paper, the ether theory emerges 1) as an answer to the question- 'What does light travel isotropic to when it travels through empty space?'. In the other case, and in the other paper ('Problems with the All Pervading Ether Hypothesis), the ether emerges 2) to preserve the notion that wave implies medium.

When the ether emerges in the first case, as an answer to the question of light propagation geometry, as I argue here, one needn't also speculate about the character of light (wave or corpuscle). Nor does one need to require that the ether be all pervading. But when the ether emerges in the second case, because of the underlying belief that wave implies medium, then one takes it as a given that electromagnetic field is a wave. Further, as described in the other paper ('Problems with the All-Pervading Ether Hypothesis), one must also interpret that the ether is all pervading (otherwise there would be pockets of empty space remaining for the electromagnetic wave to travel through).

It is for these reasons that I believe two labels of the ether are in order, to distinguish them from one another: 1) The Isotropic Ether Theory, and 2)The All Pervading Ether Hypothesis.

7.5 Does Propagation Geometry imply Propagation Character? –notes

No Notes.

7.6 Conclusion-notes

No Notes.

References

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