The Problem of Swift "Action at a Distance"

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Introduction

It is well known that currently accepted physical theory does not embrace any effect whose motion exceeds the speed of light in free space (tachyons notwithstanding). Neither accident nor design has thus far drawn much attention to any instance where this may be seen to be conspicuously untrue. A probable reason for this is the lack of serious effort made to discover such excessively rapid motion.

A search of the scientific literature of the present century discloses this omission. Nevertheless, the *Reciprocal System* theory of Dewey Larson clearly indicates that phenomena exist whose effects are felt instantaneously throughout their range of action. These phenomena have, in the past, been described as the "action at a distance" forces: *electric*, *magnetic*, and, of course, *gravitational*.

Due to the difficulties inherent in the concept of "action at a distance," it has been popular to characterize the related phenomena as "field" effects; implying some sort of interaction between the field source and the surrounding space. The field explanation is appealing to many in that it seems to side-step the philosophically troubling "action at a distance," replacing it with something at least more tangible (though no less enigmatic). All that has really been accomplished, however, is to move the problem one step backward in the chain of explanation in that having defined the force interaction to be a function of the field now requires one to explain how the field comes into being.

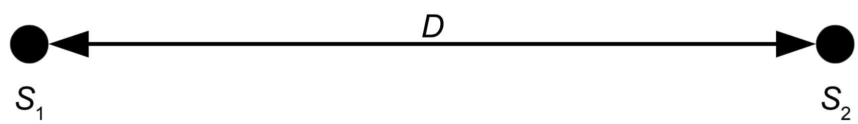

Figure 1

Need For More Testing

The problem I wish to address can be formulated as is shown in Figure 1. Suppose that two mutually complementary force field sources are located in such a proximity in space that there is a considerable force interaction. We may then ask the question: What will be the time lapse separating a perturbation of S_1 and its mechanical effect on S_2? It should be emphasized that I am not at all interested in the resulting electromagnetic radiation but only in the mechanical force interaction. Many would quickly respond to this question saying that with a knowledge of the distance D and of course, the speed of light, this could be immediately calculated. It is my contention, however, that such a calculation will not necessarily result in the correct answer as there has been no experimental verification that this effect propagates with the velocity of light, or, for that matter, with any velocity at all. What is needed is an experiment that can show, if not the exact speed of such an interaction, at least if it is or is not the velocity of light. If it is not c, then in my opinion the next likely alternative is that the rate is greater than c and in the limit infinite speed (zero time) .

Although we may theoretically use any of the three "action at a distance" effects for such an experiment, their separate characteristics are such that the electric field seems to be the most feasible for experimental implementation. Not only is the electric field easily generated, but it can also be distributed on bodies of low mass at very high potentials.

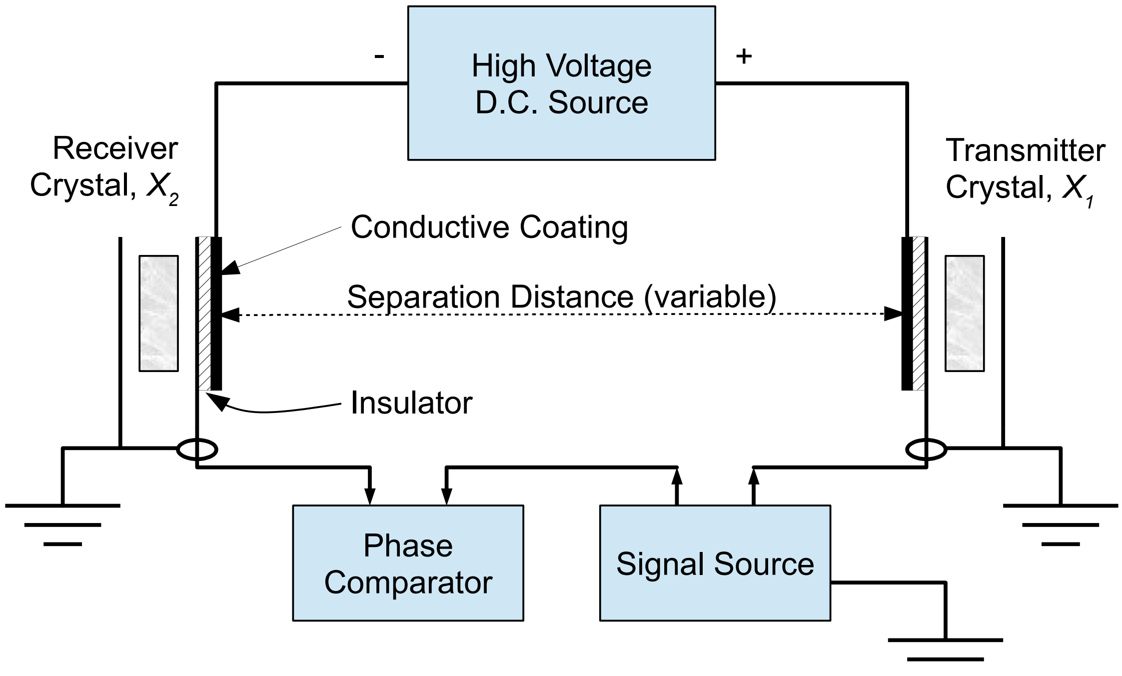

Figure 2

The experimental apparatus is shown schematically in Figure 2. It consists in the main of two resonant piezoelectric crystals, unshielded, and separated by a variable distance *r*. A high voltage source imparts a large potential difference between the crystals thereby establishing an electrostatic field. Crystal X_1 is then excited by a signal source at its resonant frequency causing it to vibrate, which in turn cyclically perturbs the electric field. Crystal X_2, by virtue of its proximity to the field, will then respond to these perturbations by undergoing resonant deformations which, due to the characteristics of these crystals, will be converted into electrical impulses. These impulses, as well as those that were used to drive X_1 are then observed on a phase comparator, which in practice can be a wide band oscilloscope. Once the phase relationship of the two signals has been established, receiver crystal X_2 is then moved a greater or lesser distance from X_1. As this is done, the phase relationship of the signals on the oscilloscope is carefully monitored.

The structure of this experiment is such that only two possible outcomes can be observed and each is significant: either the signals *undergo* a phase shift or they *do not*. If the signals undergo a relative phase shift, then it is clear that the propagation velocity of these force effects is less than infinity. If this is true, then any theory that advocates that there is not a finite transit time associated with these effects has been shown to be necessarily incorrect. On the other hand, if there is no phase shift observed, then it has been shown that there is a phenomenon that ignores the limits of the velocity of light and as such is clear testimony of the fallacy of one of the most important results of the relativity theory.

If it is found that practical limitations preclude the feasibility of this particular experimental approach, it would be possible to achieve the same end using the magnetic field and the Hall Effect. Hall conductors made of InSb are sufficiently sensitive to measure accurately fields as small as 2×10^{-4} gauss. Instead of measuring the crystal phase shifts, we could compare the relationship between the driving current of a high frequency electromagnet and the equipotential shift in a nearby Hall conductor. The principles of the experiment remain otherwise unchanged. No matter what the outcome of this experiment should be, it is evident that the results will more than justify the costs and efforts involved.

Editor's Note: Readers of *Reciprocity*, you are invited to find whether Dr. Huck's proposed experiment can accomplish his professed objective: to help decide whether an upper limiting velocity must exist in the physical universe, as implied by the theory of relativity.

The *Reciprocal System* of theory, formulated by Dewey B. Larson, implies that motion in coordinate time can and does occur at rates in excess of 3×10^5 kilometers/second. Thus, the Reciprocal theory challenges and repudiates the claim that the speed of light is an absolute limiting motion rate for the physical universe.

The question then is: Will Dr. Huck's proposed experiment show that "action at a distance" effects are independent, in fact, of the limiting motion rate imposed by the Relativity theory of Einstein, thereby supporting with experimental evidence this point in Larson's *Reciprocal System* of theory?