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Conference threads, debate and correspondence

Jacques Trempe (January 2, 1919-October 21, 1990)

Jacques Trempe was a longtime friend with whom I shared countless hours discussing problems of physics. A great admirer of Rutherford and Galileo, he was a self taught expert in relativity who consumed innumerable volumes on the subject. Jacques' passion for physics was tempered by an almost saintly patience, which he combined with an extraordinary tenacity in attacking problems. He had a habit of working solely by night.

Jacques' interest in relativity dates back almost thirty years, when I first introduced him to the subject. In the early years of our collaboration, he was an attentive student and listener. Later, however, after a thorough study and considerable hard work, he succeeded in finding what I believe is the solution to the relativity riddle.

I met Jacques Trempe in 1948 when he was working as a draftsman at Canadair in Montreal. Shortly after our meeting, I launched into a project in physics. At a meeting we had at Jacques' home in 1958,1 succeeded in interesting him in my work.

In early 1960, Jacques had rented an office in downtown Montreal from which he was attempting to sell an invention of his. The device, called the "magnedyne" was supposed to purify water by forcing it through a strong magnetic field. We would meet on Friday evenings at his office, and our blackboard scribbling often extended into the wee hours of the morning. During the latter part of the 1960s, we continued to hold our physics sessions at his home.

Throughout this period I was trying to interpret the Lorentz transformation in Galilean space-time. Using the Doppler factor, I had arrived at the value of the Galilean time of reception of a light signal by a moving observer and its relation to Einsteinian coordinates (Equations (19) in Jacques' paper published here). I succeeded in showing that the Galilean time can be equal to the Einsteinian proper time in certain circumstances ($x' = 0$). I also found that with Einstein coordinates, the Galilean time yielded the Einstein proper velocity. Thus, with this combination of Einsteinian coordinates and Galilean time, the velocity of light signals relative to moving observers turned out to be variable, unlike the Einstein velocity c_0, which, however, held only for observers fixed relative to the source.

This was the state of the theory in 1970, when Jacques was invited by W. Bezanson to give a lecture at Carlton University in Ottawa. In the weeks after the lecture, Jacques hit on the ideas that were to lead to the definitive solution to the puzzle.

He knew that when the Lorentz equations are written in Costa de Beauregard hyperbolic form, the variable called celerity is introduced as the argument of the hyperbolic functions, appearing as a ratio of the speed of an observer to the speed of light c_0. He then noticed that in the addition of velocities, the Doppler factors are multiplied while the arguments of the hyperbolic functions are added. This is indicative of a log function $D = e^{B}$, and makes the hyperbolic argument a candidate for addition of Galilean velocities along the x-axis, as follows:

$$B = B_1 B_2 = \frac{V_1 + V_2}{c_0}$$

When the equations are written as in Jacques' paper for the three space coordinates, it turns out that the hyperbolic arguments add up vectorially, as they should in Galilean space-time.

The key result of this work is that the Lorentz transformation is applicable to Galilean space-time, where the laws of classical mechanics are invariant. Since the laws of electromagnetism are invariant with respect to the Lorentz transformation, they also become invariant in Galilean space-time. It therefore unites classical mechanics with electromagnetism.

After 1971, we each investigated a different but complementary problem. Jacques was assigned to determine if the new transformations would be based upon different coordinates, but keep the same angles in both Einsteinian and Galilean space-time. I, meanwhile, looked into the possibility of retaining the Einsteinian coordinates in Galilean spacetime, with different angle measurements. We ended up agreeing that the Einstein and Galilean angles remained identical. I found that the coordinates could also be identical in certain circumstances. Jacques, however, rejected this result, insisting that the coordinates must be different in each space-time representation.

In the ensuing years we continued to disagree over this point. In 1980, Jacques suffered a heart attack which weakened him for a while. Before long he was back to his nocturnal studies, and by 1987 he was able to show that the Lorentz transformation is nothing other than another form of the equation for an ellipse, thus undermining the exclusive claim laid upon it by Einstein relativists. (This subject is dealt with in another text to be published in the journal *Physics Essays)*.

Just a few months before his death, Jacques devised a thought experiment involving two trains, where the Einstein and Galilean angles as well as the different coordinates indeed do coincide, and it appears that he *may* have satisfied himself that the Einstein and Galilean space-times are actually isomorphisms. Jacques' illness had already entered its acute phase when he decided to go ahead with publication of the text appearing in this issue of *APEIRON*. His sudden death prevented him from revising the manuscript thoroughly, and consequently the isomorphism discussion may not reflect Jacques' actual thinking on the matter.

The import of the work of Jacques Trempe may remain unrecognized for some time. In my own opinion, though, he must be credited with showing beyond a doubt that the Lorentz transformation can be applied in both the Galilean and Einstein frameworks, since Einstein relativity in fact uses the same Galilean parameters, despite a formal difference in coordinates. The fact that Jacques carried out all his work without the benefit of support from any scientific organization, and worked virtually independently demonstrates that his sole motivation was pure scientific interest.

Jacques will be remembered by those of us who knew him for his penchant for a wager and his incessant punning.

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An experiment to verify Einstein's theory of relativity

A number of experiments could be devised to verify Einstein's theory of relativity, though most of them would be difficult to implement technically.

The anomalies in the theory are conceptual aberrations, and of these invariant light velocity is the most important. The invariance claim is based upon an incorrect interpretation of the Michelson-Morley light velocity experiments using the interference pattern of two light beams from the same source that are run along different tracks. Mirrors are used to send the light in four directions. The results did not show any variation in the interference pattern, proving only that the light velocity averaged in all directions is constant. This is much like measuring the relative traffic velocity by driving an equal number of cars up and dow alongside one-way traffic. There are two relative velocities: one when the observer is driving in the same direction as the traffic, and the other when he drives in the opposite direction. When both measurements are averaged, the result is the average traffic flow speed, not the speed of the traffic relative to the observer.

Before Einstein devised his theory, Fitzgerald interpreted the Michelson-Morley experiment correctly as giving the average of the UP and DOWN velocity, and he succeeded in providing a consistent interpretation, which Einstein did not disprove. Einstein subsequently postulated that light velocity is invariant in all directions and for all observers, which of course is quite unjustified, since it is based on the assumption that average light velocity may be confused with real relative velocity of light.

The special theory of relativity is founded upon the principle of constancy of light velocity, which physicists still accept because 1) no one has ever measured light velocity on a single track, and 2) his general theory utilizes a mathematical system that improves upon classical gravity theory--this despite the logical contradictions it leads to. Its owes its practical success to the fact that it declares the absolute validity of relative velocities. Now for physically interacting objects the relative velocity of the objects is almost always the most significant one, but not absolutely so. The velocity relative to the universe is also significant, although to a far lesser degree.

For a proper test of the light constancy postulate, it is essential that the velocity be measured on a single track that is kept strictly in line with the earth's trajectory through space. The measurements should be made separately in the up and down directions. This cannot be achieved by measuring the Doppler shift because any standard light source used for the measurement will show the same Doppler shift. It is necessary to use precisely timed very short laser impulses which are separated by a highly constant time interval. A recorder at the receiver end of the light track must have the same time pattern built in so that it can be compared with the arrival times of the laser pulses. Suppose that the receiver is exactly synchronized with the laser emission from the source. It will then record a delay time of $L/(c-u)$ or $L(c+u)$.

Any change in the arrival time will prove that Fitzgerald was right. If there is no change, then Einstein's postulate of the constancy of light will have been proved correct for the first time.

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